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MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL,

1881—1882.

LONDON:
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MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL.

1881—82.

116, *Victoria Street, May* 5, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (March 23) were read and confirmed.

Read—A letter (No. 715) from the Colonial Office stating that the request of the Council (Minutes, 1880, p. 131) to be favoured with copies of any records which might be taken at the proposed observatory at Hong Kong, had been forwarded to the Governor of that Colony.

Professor Stokes communicated the following extract from the Minutes of the Council of the Royal Society:—

M.O. 877.

SIR, Foreign Office, April 23, 1881.

I AM directed by Earl Granville to enclose, to be laid before the Royal Society, copy of a note, together with a printed memorandum, which has been received from the Russian Ambassador, relative to the proposed establishment of a chain of Meteorological Stations in the Polar Regions.

The Secretary to the Royal Society, (Signed) JULIAN PAUNCEFOTE.
Burlington House.

Resolved,—That the letter from the Foreign Office now read, together with the enclosures, be referred to the Meteorological Council, with a request for suggestions and advice.

No. 108.

MONSIEUR LE COMTE, Londres, le 4/10 Avril 1881.

VOTRE Excellence n'ignore pas que l'on s'occupe depuis plusieurs années déjà dans le monde savant de l'établissement d'un réseau de stations météorologiques et magnétiques dans les régions polaires.

La Société Impériale de Géographie de St. Petersbourg, à laquelle ce projet a été référé a reçu du Gouvernement Impérial un subside de 42,000 Rbls. à l'effet de participer à sa réalisation. La station à établir par la Russie pour faire partie du réseau circumpolaire aurait eventuellement sa place à l'embouchure du fleuve Lena dans la Sibérie Orientale.

Je suis chargé par le Gouvernement Impérial de porter ce qui précède à la connaissance du Gouvernement de sa Majesté la Reine.

En m'acquittant de cet ordre je viens, en même temps, prier votre Excellence de vouloir bien faire parvenir à la "Royal Society" le Memorandum ci-joint, préparé par les soins de la Société Impériale de Géographie à St. Petersbourg.

J'ai l'honneur, &c.

S. E. M. le Comte Granville, K.G. (Signed) LOBANOW.

Read—A letter (No. 667) from the Chief Signal Officer, Washington, containing the following Memorandum in reply to the inquiries addressed to that Office by

direction of the Council, with reference to the transmission of the simultaneous observations made in the Royal Navy (Minutes, 1880, p. 117) :—

MEMORANDUM.

I. "The observations are put to use as soon as they are received at Washington.

II. "It is preferred that they should be sent by mail to the Chief Signal Officer at Washington semi-monthly, or at the very latest monthly.

III. "It is not considered advisable to return the original manuscript bulletins, inasmuch, as we have found by experience, that they are needed for reference and study at irregular intervals for three or four years after date, and great care is taken to preserve them in such shape as to be convenient of reference at any future time."

Read—A letter (No. 684) from the Chief Signal Officer, asking whether the observers in the merchant service who take the simultaneous observations, and of whose schedules copies are sent to Washington, could not be directed to post the schedules direct to Washington, so that they might reach the Chief Signal Office sooner than by the present arrangement.

Read—A letter from Mr. Blanford (Letter 625) stating, in reply to the letter from the Council (Minutes, 1880, p. 81) with regard to the Broun MSS., that he was at present unable to enter into any engagement as to dealing with these records, suggesting that Mr. C. Chambers, F.R.S., would be a fit person to undertake the discussion, and offering to ascertain whether the Rajah of Travancore would supply funds for the work, and whether Mr. Chambers would be willing to undertake it.

The Secretary was instructed to write to Mr. Blanford, requesting him to make the inquiries referred to in his letter, and thanking him for the trouble already taken by him.

Read—The following letter :—

M.O. 640.

From the METEOROLOGICAL REPORTER TO THE GOVERNMENT OF INDIA to the SECRETARY TO THE METEOROLOGICAL COUNCIL.

SIR, Calcutta, March 7, 1881.

As I am about to undertake the systematic discussion of the meteorological logs relating to Indian seas, the last instalment of which was received from you at the close of last year through the India Office, and as I understand that some changes have been recently introduced in the method of discussing marine logs in your Office, I have the honour to ask you to favour me with a description of the methods now adopted by you, and also with specimens of the printed forms used for the purpose.

I have, &c.
(Signed) HENRY F. BLANFORD,
Meteorological Reporter to the Government of India.

The Secretary was instructed to forward to Mr. Blanford specimens of the forms, &c. employed in the discussion of the Cape squares, and also early impressions of the charts themselves.

Submitted—The following report :—

SIR, Meteorological Office, March 31, 1881

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 31st March 1881.

I have continued to discharge the duties of Marine Superintendent for the past quarter.

Indian Ocean.—The sea surface temperature chart for the month of August has been completed. I had the honour to submit it to the Council on the 16th March. The charts for the months of February, May, and November are in progress ; they will probably be completed by the end of the next quarter.

Atlantic Ocean.—The sea surface temperature charts (*vide* Minutes, 9th February 1881) are in progress.

I am, &c.
(Signed) C. W. BAILLIE,
Navigating Lieutenant, R.N.

R. H. Scott, Esq., M.A., F.R.S.

Submitted (Minutes, 1880, p. 131)—A report on the fogs reported at Greenwich (40 years); at Kew (31 years); at the Local Government Board (18 years); and at Holborn Viaduct (7 years). The Secretary stated that the work had been mainly done and the diagrams drawn by Mr. Allingham.

He was instructed to forward a copy to Professor Russell.

Read—A memorandum from Mr. Baillie reporting that since the last meeting nineteen logs had been received, nine of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. E. C. Bennett	"Thessalus" -	Mar. 5, 1880—Feb. 13, 1881.	Melbourne, Calcutta, and home.	1879, p. 102.
Capt. E. Carl V. Heggum, assisted by Mr. Armstrong.	"Blythswood" -	March 19, 1880—Feb. 7, 1881.	Algoa Bay, Pondicherry, Bassein, and home.	1879, p. 122.
Capt. W. P. Hughes	"Laomene" -	July 13, 1880—April 13, 1881.	Calcutta and home -	1880, p. 27.
Capt. J. N. Jackson	"Pizarro" -	Aug. 1, 1879—March 10, 1881.	Sydney, Anjar, San Francisco, and home.	1878, p. 145.
Capt. P. Murdoch -	"Sierra Estrella"	June 15, 1880—April 8, 1881.	Bombay, Chittagong, and home.	1879, p. 51.
Capt. W. Scott -	Barque "Commewyne."	Sept. 14, 1880—March 8, 1881.	Surinam and home -	1880, p. 54.
Capt. J. Smith -	"Naiad" -	Sept. 6, 1880—March 10, 1881.	Valparaiso and home -	1880, p. 16.
Capt. H. Spalding -	Barque "Dochra"	June 18, 1880—April 11, 1881.	Java and home - -	1880, p. 27.
Capt. Thos. Young, assisted by W. Johnstone.	"City of Agra"	July 1, 1880—April 12, 1881.	Melbourne and home -	1880, p. 9.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted—The following letter:—

Translation. M.O. 888.

Imperial German Embassy,
9, Carlton House Terrace, S.W.,
May 7, 1881.

SIR,

WITH reference to our conversation yesterday, I have the honour respectfully to request that you will be good enough to reply to the questions contained in the paper which I left with you by communicating the information relative to the organisation of the meteorological observing institutions in England. Thanking you beforehand,

I have, &c.
(Signed) COUNT GUIDO LYNAR,
Secretary of the Imperial German Embassy.

1. Is there any service established in the United Kingdom which collects meteorological observations, which discussses and employs them for so-called forecasts of weather, and which publishes these forecasts by wire?
2. What is the organisation of the service (*a*) with regard to the collection and the treatment of the material, and (*b*) with regard to the publication of the results?
3. Is the service established by the State, or is it a private enterprise?
4. How is the sale and promulgation of these reports or forecasts of weather arranged? Are the weather telegrams sent to certain authorities in order to be published by them, without any charge, or are they sent on payment to private persons, as landed proprietors, editors of newspapers, &c., and are such telegrams forwarded at cheaper rates than the usual telegraph tariffs?
5. To what extent does the public avail itself of those facilities, and what effect seems to be produced for the daily life by the propagation of meteorological reports and forecasts?

Read—The following letter (Minutes 1880, p. 126):—

M.O. 860.

Park Club, 7, Park Place S.W.,
May 3, 1881.

DEAR MR. SCOTT,

I HAVE just returned to London, and am at present organising the future balloon equipment for the Royal Engineers at the Horse Guards. As this will be a work that must necessarily take me some time, I shall be happy to carry out the ascents for you as we proposed last year. I shall be at Aldershot in June, and should like to get two made before I go there, and as many as you like when there. Please get an order for six to ten ascents, as I shall then know what gas arrangements to make. I shall wait on you at the end of this week.

Believe me, &c.
(Signed) JAMES TEMPLER.

The Secretary was instructed to inform Captain Templer that the Council wish the ascents to be undertaken, and further to ascertain from him whether a formal application to the War Office is necessary; should this be the case he was authorised to make it.

SUBMITTED—The following STATEMENT respecting the RECORDS for November 1880, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868, and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH:—	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Indifferent.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.
Action														
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0	0	0	*1 hr.	‡15 hrs.	0	0	0
Orientation verified	29th	—	29th	—	17th	—	27th	—	†	—	30th	—	6th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	1	0	2	0	0	0	5	3	5	2	5	2	4
Result of 40 *Remeasurements*:—														
Greatest difference	1·0	2·0	0·0	1·0	1·0	1·0	0·0	2·0	1·0	2·0	0·0	1·0	1·0	2·0
Mean difference irrespective of sign	0·1	0·6	0·0	0·4	0·0	0·6	0·0	0·3	0·0	0·3	0·0	0·4	0·1	0·6
Residual difference (—Meteorological Office)	+0·1	—0·1	0·0	0·0	0·0	0·0	0·0	+0·1	0·0	+0·2	0·0	—0·1	0·0	+0·1

RAIN GAUGE:—														
Action	Good.		Good.		Indifferent.		Indifferent.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0		7 hrs.		0	
„ „ other causes	0		0		0		0		0		0		0	
Errors in tabulation	0		0		0		0		0		0		1	

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Do.	Do.	Do.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	1 hr.	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	0	0
„ „ other causes	0	§2 hrs.	0	0	0	0	0
No. of errors discovered—							
In entry of standard	2	0	0	2	7	3	0
„ calculating residual correction	0	0	3	2	2	1	0
„ applying residual correction	1	2	0	2	3	0	5
„ subtraction in subsidiary tables	0	0	0	7	3	3	1
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	2	1	3	1	2	0
Result of 40 *Remeasurements :—*							
Greatest difference	0·008	0·008	0·007	0·010	0·006	0·005	0·005
Mean difference irrespective of sign	0·0019	0·0026	0·0023	0·0030	0·0025	0·0023	0·0022
Residual difference (— Meteorological Office)	−0·0003	+0·0005	+0·0001	−0·0021	+0·0009	−0·0003	0·0000
Mean monthly difference between simultaneous barograph and barometer readings	0·0019	0·0025	0·0012	0·0014	0·0026	0·0014	0·0018

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Do.		Do.		Do.		Do.		Do.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	15 hrs.	15 hrs.	6 hrs.	6 hrs.	0	0
„ „ failure of light	0	0	0	0	0	0	0	0	0	0	0	0	0	1 hr.
„ „ imperfectly moistened bulbs	—	3 hrs.	—	0	—	1 hr.	—	6 hrs.	—	1 hr.	—	1 hr.	—	1 hr.
„ „ partially frozen bulbs	—	55 hrs.	—	8 hrs.	—	0	—	10 hrs.	—	24 hrs.	—	7 hrs.	—	2 hrs.
„ „ other causes	0	0	0	0	‖1 hr.	0	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	1	1	0	0	0	0	1	1	0	2	0	1	1
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	2	0	1	2	4	6	7	4	1	1	0	1
„ „ detected under glass scale	1	0	7	1	3	1	2	6	3	3	2	0	41	0
Result of 40 *Remeasurements :—*														
Greatest difference	0·3	0·2	0·4	0·2	0·3	0·3	0·2	0·3	0·5	0·2	0·2	0·2	0·3	0·2
Mean difference irrespective of sign	0·11	0·08	0·12	0·13	0·12	0·12	0·11	0·11	0·12	0·09	0·05	0·11	0·16	0·08
Residual difference (— Meteorological Office)	−0·11	+0·06	+0·11	+0·09	+0·11	+0·04	+0·04	−0·11	−0·09	−0·03	+0·02	−0·05	+0·15	+0·01
Mean monthly difference between simultaneous thermograph and thermometer readings	0·11	0·12	0·16	0·14	0·07	0·11	0·21	0·17	0·12	0·16	0·11	0·14	0·13	0·15
No. of errors in maxima and minima	0	—	0	—	5	—	4	—	6	—	1	—	5	—

* Instrument under repair. † No note or indication of orientation having been tested during the month. ‡ Trace lost through paper getting damp. § Light interfered with by clamping rods.
‖ Lost through a photographic stain.

The Secretary reported: (1) that on the 13th ultimo he had gone to Norwich and arranged the instruments sent by the Office to the Fishery Exhibition (Minutes, 1880, p. 132); (2) that the Daily Weather Reports and Forecasts had been forwarded regularly to Norwich while the Exhibition was open; and (3) that a Silver Medal and Diploma of Honour (Letter 874) had been awarded to the Office for its contributions to the Exhibition.

Submitted—The following report on the forecasts for March 1881 (Minutes, p. 31):—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

2.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	26	56	41	69
,,	b	37	19	28	
,,	c	19	14	17	
,,	d	18	11	14	
Scotland, E.	a	30	41	36	73
,,	b	41	33	37	
,,	c	15	18	16	
,,	d	14	8	11	
England, N.E.	a	22	37	29	74
,,	b	45	45	45	
,,	c	11	18	15	
,,	d	22	—	11	
England, E.	a	45	48	47	85
,,	b	40	37	38	
,,	c	11	11	11	
,,	d	4	4	4	
Midland Cos.	a	19	30	25	80
,,	b	59	52	55	
,,	c	19	18	19	
,,	d	3	—	1	
England, S.	a	40	40	40	81
,,	b	33	48	41	
,,	c	19	8	13	
,,	d	8	4	6	
Scotland, W	a	19	48	34	56
,,	b	14	30	22	
,,	c	37	22	29	
,,	d	30	—	15	
England, N.W.	a	30	52	41	76
,,	b	40	30	35	
,,	c	11	18	15	
,,	d	19	—	9	
England, S.W.	a	45	38	42	69
,,	b	15	40	27	
,,	c	30	22	26	
,,	d	10	—	5	
Ireland, N.	a	22	52	37	79
,,	b	48	37	42	
,,	c	11	3	7	
,,	d	19	8	14	
Ireland, S.	a	30	45	38	73
,,	b	37	33	35	
,,	c	19	8	13	
,,	d	14	14	14	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	29	43	36	70
,,	b	39	29	34	
,,	c	23	19	21	
,,	d	9	9	9	
Scotland, E.	a	26	45	36	75
,,	b	39	39	39	
,,	c	29	13	21	
,,	d	6	3	4	
England, N.E.	a	13	36	25	76
,,	b	58	45	51	
,,	c	16	16	16	
,,	d	13	3	8	
England, E.	a	30	39	35	83
,,	b	57	39	48	
,,	c	10	16	13	
,,	d	3	6	4	
Midland Cos.	a	30	30	30	83
,,	b	58	48	53	
,,	c	9	13	11	
,,	d	3	9	6	
England, S.	a	52	39	46	90
,,	b	39	49	44	
,,	c	9	6	7	
,,	d	—	6	3	
Scotland, W.	a	19	42	31	65
,,	b	39	29	34	
,,	c	23	26	24	
,,	d	19	3	11	
England, N.W.	a	19	48	34	75
,,	b	42	40	41	
,,	c	23	9	16	
,,	d	16	3	9	
England, S.W.	a	39	39	39	76
,,	b	29	45	37	
,,	c	23	13	18	
,,	d	9	3	6	
Ireland, N.	a	35	55	45	71
,,	b	39	13	26	
,,	c	13	26	20	
,,	d	13	6	9	
Ireland, S.	a	30	45	38	75
,,	b	42	33	37	
,,	c	9	19	14	
,,	d	19	3	11	

Summary.

British Isles	a	30	44	37	74
,,	b	37	37	37	
,,	c	18	15	17	
,,	d	15	4	9	

British Isles	a	29	42	36	76
,,	b	44	37	40	
,,	c	17	16	17	
,,	d	10	5	7	

Read—A letter, No. 887, from Mr. Ley, asking if the Council would receive from him a letter on an improved classification of Clouds.

The Secretary was instructed to reply that the Council would prefer to wait until further progress had been made with the experiments in cloud photography which they had entrusted to Captain Abney, believing that Mr. Ley would probably wish to have the opportunity of examining Captain Abney's photographs.

The first draft of the Annual Report for 1880–1 was submitted.

The Report of the International Meteorological Committee (Berne Meeting) was submitted (Minutes, 1880, p. 56).

Submitted—The following reports:—

May 2, 1881.

STATEMENT of WORK done in MARINE ROOM during March 1881.

Cape of Good Hope District.

Wind Charts.—Proofs of reduced charts received from lithographer and examined.
The charts for April, July, and October being copper-plate proofs, fresh charts have been prepared to facilitate working of lithographer.
Considering method for exhibiting wind data from which wind-roses have been drawn.

Current Charts.—Specimen chart prepared showing specific-gravity frequency diagrams.
Proofs for July, August, and October large current charts received from lithographer, and examined.
Preparing notes and explanation for charts.

Specific Gravity, Passage and Ice Chart.—Specific gravity frequency diagrams drawn for January, April, July, and October, and other data prepared for chart.

Cape Gales.—April and October diagrams drawn for Captain Toynbee. Mean results for April in hand. January letterpress forwarded to printer.

General.

Obtaining mean sea surface temperatures for January and July in Square III. for the separate years 1855 to 1871.
Obtaining particulars of rainfall from Office logs for Dr. Black.
Posting index of data in ocean 10° squares.
Correspondence with Captain Toynbee.
Mr. James assisting Lieutenant Baillie on sea temperature work throughout the month.

CHAS. HARDING.
C. W. BAILLIE.

R. H. Scott, Esq, M.A.

May 2, 1881.

STATEMENT of WORK done in MARINE ROOM during April 1881.

Examined 12 new logs and 1 lighthouse register.

Cape of Good Hope District.

Wind Charts.—Proof of January large wind chart received from lithographer and checked.

Current Charts.—Proofs of February and June large current charts received from lithographer and checked.
Considering subject-matter for letterpress.

Cape Gales.—Mean results for April completed.
Drawing final diagrams for April.
October gales classified.
Correcting proof of January letterpress.

General.

Consideration of method of working barometer means for whole globe.
Correspondence with Captain Toynbee.
Mr. James assisting Lieutenant Baillie on sea temperature work throughout the month.
Mr. Green absent through illness during the month.

CHAS. HARDING.
C. W. BAILLIE.

R. H. Scott, Esq., M.A.

March 31, 1881.

STATEMENT of WORK done in the PANTAGRAPH ROOM during March 1881.

Copper Plates pantagraphed:—11 plates, Nos. 47 to 49, 1876; Nos. 43 to 49, 1880; Chart plate, No. 5, 1879.

Zinc Plates :—Barograms, 11 plates, Nos. 50 to 60, 1880; Thermograms, 11 plates, Nos. 50 to 60, 1880; Vapour Tension, 11 plates, Nos. 50 to 54, 1876; Nos. 49 to 54, 1880; Anemograms, 7 plates, Nos. 49 to 55, 1880; Rain Curves, 12 plates, Nos. 43 to 54, 1880.

Photographic Curves are not ruled in advance of the zinc plates pantagraphed.

Two glass thermogram scales were prepared for Armagh.

The analysis of the Armagh dry-bulb curves has been completed, and about a half of the Glasgow curves have been passed through the instrument. Mr. Burton's illness has prevented greater progress with this work.

The examination work for November was passed to the Computing Room on the 25th. Mr. Allen is now occupied on work required for the Registrar General's (Ireland) return to end of this month. I have attached Mr. Allen's report.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

March 31, 1881.

EXAMINATION ROOM.—Land Observatories Department.

The following curves and tabulations have been examined since 28th February :—

November.—The month's work ; with the exception of *three Thermograms* and *the work required for the Irish Registrar General's Quarterly Report*, previously reported.

January.—*Thermograms*, two stations ; *Barograms*, two stations ; *Anemograms*, two stations.

T. E. ALLEN.

April 30, 1881.

STATEMENT of WORK done in the PANTAGRAPH ROOM during April 1881.

Copper Plates pantagraphed :—9 plates, Nos. 50 to 53, 1876 ; Nos. 50 to 54, 1880.

Zinc Plates :—Barograms, 9 plates, Nos. 50 to 55, 1876; Nos. 62 to 64, 1880; Thermograms, 6 plates, Nos. 61 to 66, 1880; Vapour Tension, none; Anemograms, 5 plates, Nos. 56 to 60, 1880; Rain Curves, 6 plates, Nos. 55 to 60, 1880.

Photographic Curves are ruled to Plate 65, 1880, in the case of the barograms ; the thermograms are not in advance of the plates pantagraphed.

A few small things, such as new templates for Wagner's Pantagraph, have also been done with the pantagraphs during the month.

Mr. Burton's continued illness has prevented further progress with the Harmonic Analyser work.

The examination work for December 1880 is not yet completed, but Mr. Allen's report, attached, shows that progress has been made with the work for later months required for the Registrar General for Ireland.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

April 30, 1881.

EXAMINATION ROOM.—Land Observatories Department.

The following curves and tabulations have been examined since 31st March :—

December : *Thermograms*, seven stations ; *Barograms*, five stations.

February : *Thermograms*, two stations ; *Barograms*, two stations.

March : *Thermograms*, two stations ; *Barograms*, two stations.

T. E. ALLEN.

Reported—That the Daily Weather Charts had been supplied to Mr. E. T. Dowson, Geldeston, Beccles, in return for observations.—Approved.

Reported—That Mr. J. T. Williams had been appointed a temporary clerk (Minutes, 1880, p. 126) at a weekly salary of 12*s.* for eight hours work. And that as Mr. Newton's salary, whose vacancy was now filled up, had been 1*l.* per week, the three boys, Woolston (2*s.*), Parsons (1*s.*), and Bracey (1*s.*), had received the weekly increments placed after their names since March 1.—Approved.

Read—A letter (No. 779) from Mr. Glyde saying that he was unable to make experiments with the nephoscope (Minutes, 1880, p. 109). Mr. Scott was instructed to request him to return it.

Submitted—The following statement of accounts for the year ending 31st March 1881:—

Income.	£ s. d.	£ s. d.
Balance from year 1879–80		470 17 1
Vote for year 1880–81		15,000 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	20 1 3	
(2.) Special researches*	46 8 7	
(3.) Observatories and stations	9 0 0	
		75 9 10
Supply of Weather Information:		
Special 8h. p.m. reports	516 14 11	
Charts and ordinary forecasts	352 4 3	
Ordinary information for Press Agencies, &c.	124 16 10	
Telegrams	217 2 4	
		1,210 18 4
Supply of Ocean statistics		23 13 6
Miscellaneous data		17 18 11
Sale of Instruments, &c.:		
Royal Navy account	20 1 9	
Mercantile Marine do.	69 0 0	
		89 1 9
Commission charged on work done for Colonies, &c.		32 2 11
		£16,920 2 4

Expenditure.	£ s. d.	£ s. d.
Administration:		
Payment of Council	1,000 0 0	
Secretary	800 0 0	
Salaries and wages	711 7 5	
Rent, fuel, and lighting	666 4 7	
Furniture and fittings	130 0 7	
Incidental and contingent expenses	352 9 7	
Expenses incidental to International Meteorological Congress	33 10 9	
		3,693 12 11
Special Researches:		
Mr. Burton's salary	38 10 0	
Rainfall observations	200 0 0	
Additions to Mr. De La Rue's anemometer	26 13 0	
Erection and care of bridled anemometer	82 11 7	
Aids to Study and Forecast of Weather	66 6 6	
Discussion of Arctic Observations	61 10 0	
Sunshine cards, &c.	30 19 1	
Transfers from heads "Weather Information" and "Ocean Meteorology"	150 0 6	
Sundry charges	125 8 10	
		781 19 0
Land Meteorology:		
Observatories and stations	2,358 12 6	
Discussion and reduction of observations	1,416 18 2	
		3,775 10 8
Weather Information and Forecasts:		
Telegraphic reports and storm warnings	3,103 14 1	
Preparation and issue of reports and forecasts	1,421 10 8	
		4,525 4 9
Inspections:		
Salaries and travelling expenses		520 10 6
Ocean Meteorology:		
Discussion and reduction of observations	1,451 3 4	
Expenses incidental to the supply of instruments:		
Care and issue of instruments	200 0 0	
Royal Navy	138 16 4	
Mercantile Marine	332 19 5	
Distant island and coast stations	98 10 7	
		2,221 9 8
Balance		1,401 14 10
		£16,920 2 4

Liabilities.	£ s. d.	Assets.	£ s. d.
To Post Office (partly estimated)	381 13 7	By cash at Bank	2,111 14 1
„ sundry creditors	747 14 0	„ „ at Office	208 13 11
„ „ (contracts or work uncompleted)	369 16 0	„ „ at Valencia	50 0 0
„ balance	1,401 14 10	„ sundry debtors	530 10 5
	£2,900 18 5		£2,900 18 5

* For Hoffmeyer's charts, Sun apparatus, &c.

Reported—That the following cheques for March were drawn on the 31st of that month:—

	£ s. d.	£ s. d.
Administration:		
Professor H. J. S. Smith, salary	*291 17 9	
W. De La Rue, fees	*147 10 5	
Captain F. J. O. Evans, R.N., fees	*98 15 5	
F. Galton, fees	*142 16 4	
Professor G. G. Stokes, fees	*133 8 2	
General R. Strachey, R.E., fees	*156 18 6	
		971 6 7
R. H. Scott, salary	-	66 13 4
J. S. Harding, jun. } Salaries and wages	27 15 6	
T. D. Bell }	13 6 8	
J. S. Harding, sen. }	†8 19 8	
		50 1 10
C. W. Jacques, rent, No. 116	133 13 0	
„ „ No. 113	18 0 6	
		151 13 6
General Fire Assurance Co. (Policy No. 124,817)	1 6 0	
„ „ („ No. 133,438)	1 2 0	
		2 8 0
Pickford & Co., carriage of parcels	-	1 2 7
Williams and Norgate, books	-	7 9 9
Special Researches:		
R. & J. Beck, Nephoscope	-	8 15 0
E. I. Strachan, Arctic work	-	4 17 6
W. Thomas, care of Scilly Anemometer	-	2 4 0
H. Williams, care of Bridled Anemometer	-	13 4 4
Land Meteorology:		
C. Niven, Aberdeen	-	64 17 0
T. R. Robinson, Armagh	46 19 0	
„ „ (expenses)	9 11 10	
		56 10 10
W. L. Fox, Falmouth	-	72 19 0
R. Grant, Glasgow	68 8 4	
„ payment for observations during frost	1 10 0	
		69 18 4
H. Williams, Holyhead	-	2 14 8
G. M. Whipple, Kew	-	100 0 0
C. Clouston, Orkney	-	2 19 3
G. H. Aird, Seaham	-	2 13 9
S. J. Perry, Stonyhurst	-	56 6 4
J. E. Cullum, Valencia	43 18 11	
„ „ (salary)	16 13 4	
		60 12 3
G. T. Watson, Yarmouth	-	4 8 6
B. & J. Beck, repairs	-	1 5 1
R. H. Curtis } Discussion, &c. of observations	22 4 5	
J. A. Curtis }	15 11 1	
T. E. Allen }	15 11 1	
C. H. Thompson }	†9 4 0	
E. G. Aldridge }	†7 6 8	
		69 17 3
Carried forward		£1,944 18 8

	£ s. d.
* Deductions for income tax	25 0 0
Expenses (31st January) per J. S. Harding, junior	3 13 5
Payments this day as above	971 6 7
Total	£1,000 0 0

† Four weeks ending 26th March.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	1,944	18	8
Weather Information and Forecasts:						
Postmaster General, telegrams - - -	-		-	165	10	5
G. Carrick, Ardrossan - - - -	-		-	0	19	10
Postmaster, Bundoran - - -	-		-	1	6	0
H. Todd, Cambridge - - - -	-		-	4	11	0
H. Mohn, Christiania - - - -	-		-	5	10	0
Postmaster, Cliffony - - - -	-		-	0	19	6
T. MacGowan, Donaghadee - - -	-		-	0	13	0
J. Costello, Dover - - - -	-		-	3	18	6
W. Brand, Dunrossness - - -	-		-	2	16	0
Postmaster, Enniskillen - - -	-		-	0	19	6
G. Wooding, Hawes Junction - - -	-		-	3	18	4
J. Tilston, Holyhead - - - -	-		-	3	18	0
G. G. Appleton, Hurst Castle - - -	-		-	3	18	5
Postmaster, Inverness - - - -	-		-	1	6	0
J. Fisher, Jersey - - - -	-		-	4	5	6
Postmaster, Killarney - - - -	-		-	0	19	6
J. Hutchison, Leith - - - -	-		-	0	13	0
F. Gaster, London - - - -	-		-	3	18	0
K. Kerr, Mullaghmore - - -	3	19	1			
„ (Conway's Account) - - -	5	17	7			
				9	16	8
W. D. Penny, Nairn - - - -	-		-	4	4	6
M. Mackintosh, Nairn - - - -	-		-	0	13	0
E. J. Lowe, Notts - - - -	-		-	3	18	0
H. E. C. Bellamy, Oxford - - -	-		-	3	12	6
W. Harding, Parsonstown - - -	-		-	2	4	6
J. John, Prawle Point - - - -	-		-	3	5	0
G. Baker, St. Ann's Head - - -	-		-	4	0	6
W. Thomas, Scilly - - - -	-		-	4	19	0
R. W. Scaddard, Scilly - - - -	-		-	0	13	0
J. Sibert, Spurn Head - - -	-		-	3	5	10
J. Sinclair, Wick - - - -	-		-	3	5	0
Postmaster, „ - - - -	-		-	1	6	0
Postmaster, Valencia - - - -	-		-	0	13	0
G. T. Watson, Yarmouth - - -	-		-	4	12	0
A. Guy, York - - - - -	-		-	3	18	0
F. Gaster - W. L. Dallas - F. Brodie - H. W. Chivers - Preparation, &c. of Weather Reports.	30	7	6			
	19	15	1			
	19	15	1			
	*6	12	0			
				76	9	8
Inspections:						
A. Buchan, salary - - - -	37	10	0			
„ expenses - - - -	0	8	0			
				37	18	0
W. C. Ley, salary - - - -	-		-	37	10	0
Ocean Meteorology:						
R. Strachan - - C. Harding - - H. Harries - - Lieut. C. W. Baillie, R.N. Discussion, &c. of observations, and care of instruments.	27	15	6			
	22	4	5			
	*11	4	0			
	16	13	4			
				77	17	3
R. Rivière, labels for presentations - -	-		-	3	14	0
J. H. Woodstock, packing cases - -	-		-	1	15	6
Carried forward -	-		-	£2,344	10	1

* Four weeks ending 26th March.

	£ s. d.	£ s. d.
Brought forward -	- -	2,344 10 1
Miscellaneous:		
W. Allingham, commissions - - -	- -	6 2 10
C. Harding, „ - - -	- -	2 11 11
E. I. Strachan, „ - - -	- -	7 19 2
J. S. Harding, jun., petty cash - -	120 0 0	
„ „ - -	60 0 0	
	—— ——	180 0 0
		£2,541 4 0

Reported.—That the following cheques for April were drawn on the 31st of that month:—

	£ s. d.	£ s. d.
Administration:		
R. H. Scott, salary - - - -	- -	66 13 4
J. S. Harding, jun. }	27 15 6	
T. D. Bell - - } Salaries and wages -	13 6 8	
J. S. Harding, sen. }	*11 4 7	
	——	52 6 9
Gas Light and Coke Company, gas - -	- -	5 6 1
G. A. Gillett, wood - - - -	- -	1 2 6
Pall Mall Coal Company, coals - -	- -	5 10 0
Maple & Co., carpets, &c. - - -	- -	18 17 0
H. Bond & Son, office repairs and fittings -	- -	58 7 10
Pickford & Co., carriage of parcels - -	- -	1 12 1
E. I. Strachan, correction of forms, &c. -	- -	3 7 6
Special Researches:		
B. M. Allingham, extraction of fog observations	- -	3 17 0
T. De La Rue & Co., sunshine cards - -	- -	16 9 0
Land Meteorology:		
J. E. Cullum (Valencia), salary - -	- -	16 13 4
Hopkin & Williams, chemicals - -	- -	4 15 8
R. W. Munro, observatory repairs - -	- -	5 9 6
R. H. Curtis - }	22 4 5	
J. A. Curtis - } Discussion, &c. of observa-	15 11 1	
T. E. Allen - } tions.	15 11 1	
C. H. Thompson - }	*11 10 0	
E. G. Aldridge - }	*9 3 4	
	—— ——	73 19 11
Weather Information:		
Postmaster General, telegrams - - -	- -	146 13 7
F. Dangerfield, delivery of charts - -	- -	10 19 0
J. Sutherland, Stornoway reporter - -	- -	4 0 10
F. Gaster - }	30 7 6	
W. L. Dallas - } Preparation, &c. of Weather	20 12 1	
F. Brodie - } Reports.	20 12 1	
H. W. Chivers }	*8 5 0	
	—— ——	79 16 8
Ocean Meteorology:		
R. Strachan - - } Discussion, &c. of	27 15 6	
C. Harding - - } observations and	22 4 5	
H. Harries - - } care of instru-	*14 0 0	
Lieut. C. W. Baillie, R.N. } ments.	16 13 4	
	—— ——	80 13 3
Carried forward -	- -	£656 10 10

* Five weeks to the 30th April.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	656	10	10
Ocean Meteorology—*continued*.						
G. M. Whipple, verifications "A." account -	6	0	0			
Do. do. "B." „ -	0	7	6			
				6	7	6
J. R. Jones, Aberdeen agent - - -	-		-	6	14	0
P. A. Feathers, Dundee agent - - -	-		-	1	5	0
D. McGregor & Co., Glasgow agent - -	-		-	8	5	0
J. Gill, Liverpool agent - - -	-		-	9	6	0
L. P. Casella, rain gauges - - -	-		-	24	0	0
E. Price Edwards, advertisements - -	-		-	1	2	6
A. G. Evans, care of Bermuda anemometer -	-		-	4	11	0
P. Riddle „ „ -	-		-	4	10	0
Miscellaneous:						
P. Adie, commissions - - - -	-		-	11	9	0
Chance Brothers & Co., commissions - -	22	10	0			
„ „ „ - -	3	15	0			
				26	5	0
G. M. Whipple, commissions - - -	10	0	0			
„ „ - - -	1	1	0			
				11	1	0
J. S. Harding, junr., petty cash - -	120	0	0			
Do. do. - -	80	0	0			
				200	0	0
Total -			-	£971	6	10

The Council then adjourned.

116, *Victoria Street, May* 12, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (May 5) were read and confirmed.

The following reply to the Chief Signal Office, Washington, (Letters 667 and 684; Minutes, p. 1) was approved, and the Secretary was instructed to forward it:—

M.O. 667 and 684.

SIR,

I AM instructed by the Council of this Office to reply to your two letters of the 17th and 18th ultimo, of which the former relates to the transmission to your office of simultaneous observations (A) taken on board the ships of Her Majesty's Navy at 0h. 8m. G.M.T. in accordance with a telegraphic application made by the late General Myer to Captain Evans, Hydrographer of the Admiralty, under date 25th February 1880; the second relates to the simultaneous observations (B) recorded in logs from British ships received in this Office, copies of which have been for some years past forwarded to the Chief Signal Office.

With regard to the memorandum enclosed in your first letter, I am instructed to state that the Council will forward to you, *semi-monthly*, copies of all schedules received up to date. As the instructions to the officers of H.M. Navy are to post the schedules to London by the first available mail, the Council hope that the copies will reach the Chief Signal Office in time for the use for which they are intended. These copies the Chief Signal Office will, of course, be at liberty to retain; a charge for copying (as has hitherto been the case with the simultaneous observations B) being regularly forwarded to you.

With reference to your second letter, I am instructed to explain that the Council will for the future forward the copies of the simultaneous observations (B) with the least possible delay after the receipt of the logs which contain them, but that they cannot suggest to captains in the Mercantile

Marine who observe for them at sea, and undertake that duty only as volunteers, either to record their observations in duplicate, or to forward copies of them by post.

As some of the logs received by this Office are for very protracted voyages covering more than a year, it cannot be expected that the simultaneous observations (B) will reach you in time for use in the International Bulletin. The Council, however, hope that in a very short time they will be in a position to forward regularly a number of schedules (A) sufficient for the purpose for which you require them.

I am, &c.
(Signed) ROBERT H. SCOTT.
Secretary.

The Chief Signal Officer,
War Office, Washington, U.S.

Submitted—The following draft of a letter in reply to the resolution of the Council of the Royal Society, on the project for simultaneous observations in the Polar Regions communicated at last meeting (Minutes, p. 1) :—

With reference to the communication addressed to this Council by the Council of the Royal Society, I am requested to reply as follows :—

1. The Meteorological Council consider that the establishment of a circumpolar chain of meteorological and magnetic observations to be maintained for a definite and limited time would undoubtedly be conducive to the advancement of scientific knowledge, and on this point they are disposed generally to agree with the views of the International Polar Conference held at Hamburg in October 1879, as expressed in the Report of that Conference, so far as those views relate to meteorological science and thus come within the province of this Council.

The Council understand, though they have not received any official information, that the establishment of the following stations by different Governments has been in contemplation :—

1. Spitzbergen (Sweden).
2. Vardöhuus near the North Cape (Norway).
3. Nova Zembla. Count Wilczek (Austria).
4–5. The mouths of the Lena and Kolyma (Russia).
6. Point Barrow } (The United States).
7. Franklin Bay }
8. Upernavik (Denmark).
9. Jan Mayen (Germany).

It is also expected that France will undertake an Antarctic expedition, or at least establish an observatory near Cape Horn.

It will be seen from this enumeration that if the United Kingdom should take part in the proposed undertaking, the North American coast, within or close to the Arctic circle and say between the meridians of 60° and 120° W. would seem to be indicated as the region in which a station should be established in order to give the chain some degree of completeness. This region, however, is certainly more difficult of access than most of the places enumerated in the above list, and the establishment of a station in it would be proportionately more costly. In fact, the expense of organising and maintaining such a station for a period of twelve months would probably involve an outlay equal to that required for a wintering expedition in the Arctic regions, and the Meteorological Council would hesitate to recommend that the Government should be advised to enter upon such an undertaking except after a very full consideration of all the circumstances of practicability and cost. The Council observe that it is suggested that the twelve months should commence in 1882; this they think would scarcely be possible in the case of some of the stations mentioned.

One of the first points to be decided would be whether such an expedition should proceed to its destination overland or by sea, and on this point the Meteorological Council do not feel that they have sufficient information to enable them to offer an opinion. They therefore think that if the Government desire to be further advised on the subject, it should enter into communication with the Government of Canada, which might possibly be in a position itself to undertake what is requisite for the purpose in view, and would certainly be better able to advise than any authority in this country.

Submitted—The following draft reply to the questions contained in the letter from the German Embassy, relative to the forecast system (Minutes, p. 3) :—

1. Is there any service established in the United Kingdom which collects meteorological observations which discusses and employs them for forecasts of weather, and which publishes these forecasts telegraphically ?

1. The Meteorological Office collects telegraphically observations of weather and employs them for the preparation of daily forecasts.

These forecasts are posted up in public places in London and are supplied free of charge to newspaper agencies for transmission by wire to provincial papers, but the Office does not defray the cost of transmission. They are published by about 100 journals.

In addition, the Office telegraphs (whenever occasion arises) warnings of approaching storms to more than 100 ports and fishing stations, defraying the cost.

2. What is the organisation of the service (*a*) with regard to the collection and treatment of the material, and (*b*) with regard to the publication of the results ?

2. *a* and *b*. The arrangements for collection of the information and for publication of the forecasts are explained in the last published Report of the Office, for 1879–80, at p. 11, and in Appendix VII. (copy herewith).

Since the date of that report, the arrangements for the issue of forecasts to provincial papers were organised, at the end of the year 1880, on the system described under (1).

3. Is the service established by the State, or is it a private enterprise?

3. The service was established and is maintained by the State; its scientific management is vested in a Council nominated by the President and Council of the Royal Society. It is not a private enterprise. Its funds are supplied by an annual Parliamentary Vote, and its accounts are controlled by Her Majesty's Treasury.

4. How is the sale and promulgation of the reports and forecasts of weather arranged? Are the weather telegrams sent to certain authorities in order to be published by them without any charge, or are they sent on payment to private persons, such as landed proprietors, editors of newspapers, &c., and are such telegrams forwarded at cheaper rates than the usual telegraph tariffs?

4. This question has been partially answered under (1).

The forecasts are supplied gratis to newspapers.

They are prepared twice a day, at 11 a.m. and 8 p.m.; the 11 a.m. forecasts are issued to clubs in London for a subscription, are lithographed in the Daily Weather Report (copy herewith), and are issued gratis to public offices and to certain persons who undertake to exhibit them for the information of the public, as explained in Appendix VIII. to the Annual Report.

There are no provincial authorities acting as district centres for their publication.

The Daily Weather Report, containing the 11 a.m. forecast, is sent by post to about 270 subscribers of 1*l.* per annum. This payment does not much more than cover cost of postage, &c. But, when forwarded by post, the forecast for any period of 24 hours does not reach recipients in the country until the period has nearly expired.

The 8h. p.m. forecasts are disseminated mainly through the public press.

During the hay season of the last two summers, forecasts prepared at 3h. p.m. have been transmitted, free of charge, in connexion with the Royal Agricultural Society, the Highland Society, and the Royal Dublin Society, to a certain number of persons interested in agriculture, as explained in the Annual Report, p. 15.

Forecasts are issued to persons applying for them (1) personally, (2) by letter, or (3) by telegraph. A charge of 1*s.* is made in addition to the cost of transmission, but the applications are not very numerous, and have materially diminished in number since the forecasts have appeared extensively in newspapers.

There is no reduction of the telegraphic tariff for any of the forecasts or storm warnings, but the telegraphic reports from the observing stations are forwarded at "press rates," which are much lower than ordinary rates, as the messages are not limited to 20 words.

5. To what extent does the public avail itself of these facilities, and what effect seems to be produced in daily life by the propagation of meteorological reports and forecasts?

5. From the nature of the case it is difficult to obtain evidence of the practical use made by the public of the daily forecasts. In the earlier days of their issue by the Office a charge was made to certain newspapers, which were exclusively supplied with the information, but the great interest evinced by the public in the weather information induced the Government to sanction the gratuitous issue of the forecasts to the metropolitan and provincial press.

There is abundant evidence of the high appreciation of the storm warnings by seafaring people, and by the general public. A passage in the report (at p. 16) relating to the hay harvest forecasts may also be referred to in this connexion.

Reported—That Captain Toynbee had returned to the Office on the 9th instant (Minutes, 1880, p. 53).

Submitted—The following report (Minutes, 1880, p. 113):—

M.O. 883. Chemical Laboratory,

GENTLEMEN, St. Bartholomew's Hospital, E.C, May 6, 1881.

THE Sub-Committee you appointed to investigate the nature and chemical composition of fog beg to report that they met on December 10th last, and after duly considering the matter, determined to commence the investigation by undertaking the following determinations: (*a*) The amount of carbon and nitrogen in the solid form in the air, during fog, removing it by filtering the air through asbestos; (*b*) The amount of ammonia which would be given under similar conditions by a similar asbestos plug; (*c*) The amount of carbonic acid in the air both before and after filtration through cotton wool; (*d*) The total amount of moisture and suspended matter in the air; and (*e*) A chemical and microscopical examination of the impurities which would be removed from the air by thorough washing. The Committee considered that the above determinations would be simply tentative, and that the results obtained would probably indicate numerous modifications in the methods of experiment and additions to the directions in which the inquiry should be pursued.

The first experiments were to be made in the City, at St. Bartholomew's Hospital, and the reporter undertook to carry them out. Some half-dozen experiments of the above character have been carried out. Two circumstances, however, acted adversely to the carrying on of the investigation; the first was the absence to a great extent of fogs, more especially in the City, as on several occasions during last winter there was at the West End a considerable fog when it was comparatively clear in the City. The other circumstance was that the bulk of air such as in an ordinary laboratory experiment can be operated on, is too small in amount to yield definite and satisfactory results; the fogs often lasting comparatively a short time, means must

therefore be provided for aspirating considerable quantities of air. In the experiments that have been made aspirators holding 2 cubic feet of water were used, and from about 4 to 8 or 9 cubic feet of air experimented on, and in no case were the experiments made during a dense fog. The results obtained showed clearly that very much larger quantities of air must be used. In carrying out the seven experiments that have been made valuable experience and information has, however, been obtained, especially as to a method of thoroughly washing the air, and also as to the estimation of the sulphuric acid found in such wash water; but as the above experiments are imperfect and can only be regarded as preliminary, it is thought best not to append the numbers obtained.

Another branch of the inquiry which the Committee think it desirable to pursue, is the investigation of the circumstances under which artificial fog can be produced; with this object in view they have had some apparatus constructed, but have not been able yet to experiment with it.

The purely preliminary work which has thus far been undertaken has shown that to pursue the subject with a probability of the attainment of useful data, necessitates preparations for experiments on a much larger scale, and the Committee will be glad to be informed whether they have the sanction of the Meteorological Council to make such preparations before next autumn.

I have, &c.

To the Meteorological Council. (Signed) W. J. RUSSELL.

Submitted—The following report (Minutes, 1880, pp. 17 and 41):—

REPORT on HYGROMETERS and EVAPORIMETERS, presented to the METEOROLOGICAL COUNCIL May 10, 1881.

Hygrometers.

During the past year experiments have been made with most of the instruments under my charge. But Schwackhöfer's instrument, all the important glass parts of which were broken on arrival here, is not yet in working order. The glass work was replaced by Mr. Hicks, of Hatton Garden, but an accident in fitting the parts together reduced the instrument practically to its previous state. It has, however, been refurnished with the necessary glass, and I now hope that it will be in full working order in a few days.

The dew-point hygrometers, including two specimens of Regnault's, Alluard's and Dines's instruments, have been enclosed in a glass case, the aspiration tubes passing through the sides, so that the same mass of air remained in contact with the instruments throughout a series of observations, and no evaporation of ether or water took place in the case. The observations made with these instruments showed very little discordance. They were discontinued in order that some of the thermometers employed might be compared at Kew. A hair hygrometer was included in the case and its indications compared with those of the dew-point instruments.

A few wet-bulb thermometers have been arranged on the screen mentioned in the previous report; the bulbs of the thermometers differed in size but not very widely; the method of moistening was the same for all. The effect of regulating the motion of the air past the bulbs was made very distinct by a large number of observations; the indications, which were almost always discordant, becoming identical as soon as the current of air was established.

In reference to observations with wet-bulb thermometers, it should be noticed that there are two sets of tables published by which the relative humidity of the air may be obtained from the observations made: (1.) Glaisher's tables, in use in English meteorological stations and formulated by experimental comparison of the dry and wet bulb with Daniell's dew-point instrument; (2.) Jelinek's tables calculated from empirical formulæ established by Regnault. These two sets of tables show a considerable divergence when the difference between the wet and dry-bulb readings is large. The following instance will illustrate this:—

Temp. of Dry Bulb F.	Temp. of Wet Bulb F.	Relative Humidity according to	
		Glaisher.	Jelinek.
41	41	100	100
—	40	92	91
—	39	84	83
—	38	77	74
—	37	70	66
—	36	64	57
—	35	58	49
—	32	43	25

It thus appears that important differences occur when the air is in a state on which psychrometric observations may often be made.

I am unable at present to offer reasons for preferring one of these sets of tables to the other.

I have made various experiments upon the influence of the radiation from surrounding objects upon the temperature of the wet bulb, but the results at present are not very decisive.

It has occurred to me that some valuable information as to the processes going on in the neighbourhood of the wet bulb might be obtained by using some other volatile fluid than water for the moistening liquid. I accordingly mounted two wet bulbs, one moistened with water and the other with methylated spirit, upon an ordinary dry and wet-bulb stand. The difference of their

readings was initially 10° but in the course of 12 hours it was reduced to 1° and was maintained for days uniformly at that amount, through considerable variations of temperature of the air. Further experiments on the subject are in progress.

Evaporimeters.

In August last a number of evaporimeters were received by me from the Meteorological Office for experiments upon the relative value of their indications. The selection comprises instruments on Wild's and Lamont's patterns in which water is evaporated from a free water surface. Also two specimens of De la Rue's evaporator, and one by Piche, where the evaporation takes place from a wetted parchment surface and a blotting-paper surface respectively.

These instruments have been exposed to the air together, and a number of comparative readings obtained. They show a very wide divergence; as an instance, the total evaporation between March 3 and March 10 of this year, as determined by the different instruments, was as follows:—

Lamont 1·84 lines - - -	= 3·88 mm.
Wild - - - -	= 2·85 „
De la Rue (1) ·143 in. - -	= 3·61 „
De la Rue (2) ·125 in. - -	= 3·16 „

During this time 97·3 mm. of the water in the tube of Piche's evaporimeter were evaporated, the instrument being hung in the same room in a position more favourable for evaporation. This instrument requires an experimental comparison with some other of the instruments in order to obtain from its indications the equivalent depth of water evaporated. My temporary estimate of this absolute value of its indications is that 20 mm. of Piche's scale are equivalent to 1 mm. of evaporation from free water surface.

(Signed) W. N. Shaw.

Emmanuel College, May 10, 1881.

The Secretary reported that he had been officially informed (Letter 852) that the Meteorological Institute of Switzerland, hitherto maintained by the Natural History Society at Zurich, had been made a Government establishment, and Dr. Billwiller appointed Director.

The draft of the Annual Report was further considered.

116, *Victoria Street, May* 18, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.	LIEUT.-GENERAL STRACHEY.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 12) were read and confirmed.

The reply to the communication from the Council of the Royal Society, submitted at last meeting (Minutes, p. 14), was adopted, and the Secretary was instructed to forward it.

The reply to the letter from the German Embassy respecting forecasts (Minutes, p. 15) was adopted, and the Secretary was instructed to forward it.

Submitted—Letter 923, from the Chief Signal Office, Washington, inviting the Council to offer suggestions as to the mode of publication of the daily bulletin and map of international simultaneous meteorological observations.

Read—A letter (No. 920) from Mr. O. T. Olsen, of Great Grimsby, asking if the Council would be disposed to supply to trawlers in the North Sea instruments and forms for recording observations, especially of bottom temperatures.

The Secretary was instructed to reply that the Council are not at the present time in a position to adopt the suggestion made to them by Mr. Olsen.

Read—A memorandum from Captain Toynbee reporting that since the last meeting six logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. Jas. Buchan -	"Coppename" -	Dec. 28, 1880—May 2, 1881.	Surinam and Barbadoes -	1880, p. 96.
Capt. C. M. Dobson	S.S. "Sunbeam"	Oct. 8, 1880—April 20, 1881.	Odessa, Antwerp, and Bombay.	1880, p. 54.
Capt. H. Longley -	S.S. "Yorkshire"	Jan. 1—April 9, 1881.	Cardiff, Genoa, and Baltimore.	1880, p. 82.
Capt. M. Nicholson	"John Rennie"	Aug. 24, 1880—May 2, 1881.	Adelaide and home -	1880, p. 31.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted—The sea-surface temperature charts for the Indian Ocean for February and May (Minutes, p. 2).

The draft of the Annual Report was further considered.

Read—Letter 948 from Mr. H. W. Chivers, asking for an increase of pay in consequence of his undertaking the printing of the forecasts in the Office.

The Secretary was authorized to allow 3*s*. per week extra pay for this work, to date from the 1st April.

The English edition of the Report of the International Committee (Minutes, p. 7) was approved, and the Secretary was authorized to publish it.

116, *Victoria Street, June* 2, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.	PROFESSOR STOKES.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (May 18) were read and confirmed.

Submitted—The following letter:—

M.O. 982.

SIR, Downing Street, May 25, 1881.

WITH reference to the letter from this Department of the 14th of February last, and to your reply of the 29th of March, I am directed by the Earl of Kimberley to transmit to you, to be laid before the Council of the Meteorological Office, a report by Mr. Maxwell Hall on the progress of his scheme for the establishment in Jamaica of a central Meteorological Observatory.

His Lordship would be glad to receive any observations on the subject which the Council may have to offer.

I am, &c.

The Secretary, Meteorological Office. (Signed) EDWARD WINGFIELD.

The Secretary submitted the following précis of Mr. Maxwell Hall's report:—

1. The United States Government has contributed 120*l.* per annum since June 1, 1880, to the service in Jamaica.

2. A similar sum is paid by the same Government to observers at Havana, Santiago de Cuba, St. Thomas, and Barbadoes.

The observations are to be taken at the hours fixed by the Chief Signal Office, and are to be posted to Washington, telegrams being sent occasionally.

3. No communication has been received from General Hazen, who succeeded the late General Myer at the Signal Office in Washington.

4. The Government of Jamaica has contributed 150*l.* per annum since Oct. 1, 1880.

5. Rules are given for the service in Jamaica as to telegraphic reports and their publication in newspapers, &c., as to rainfall observations, and as to storm warnings.

6 and 7. Particulars as to the way in which these rules are carried out, *e.g.*, it is stated that 120 rain gauges are in operation.

8. The results already obtained as to rain distribution.

9. Notes on the connection between dysentery and *excessive* diurnal range of temperature.

10. An application to Washington for warnings of "*Northers*" in the Gulf of Mexico received a reply asking for the dates of these gales in order to ascertain whether they could be identified with gales reported to the Chief Signal Office. Mr. Hall was absent on inspection at the time, and the matter has not gone further.

11. Correspondence opened with Belize, Turks Islands, Port au Prince, and other stations, to get observations for study of Northers; but such observations at present are not of much value above the sea level, as the instruments are unverified.

12. A station established at the Cinchona Plantations in the Blue Mountains, 5,000 feet above the sea level, and 12 miles distant from Kingston in a direct line.

13. Seismometry is being studied; correspondence has been commenced with Professor Palmieri on this subject.

No apparatus for earthquake observations can be fitted up unless a central observatory is established.

14. Negotiations as to intercolonial service. Mr. Hall's previous letters and visits to England. It is now highly improbable that such a service will be established, but the idea of a central station has been steadily kept in view.

An extract from a paper by Mr. Hall on the proposed meteorological system for Jamaica printed in the "Hand-Book of Jamaica" (12 folios) follows, with an account of the probable cost of outfit for proposed stations in Jamaica and elsewhere. The paper concludes by expressing the hope that an observatory may be established by the Government of Jamaica, in which case Mr. Hall will transfer his own instruments to it.

Submitted—A circular (Letter 957) from the International Polar Committee, stating that six countries had announced their adhesion to the scheme for simultaneous observations to begin in the autumn of 1882, and that a third International Polar Conference was convened for August 1, 1881, at St. Petersburg.

Reported—That the first instalment of simultaneous observations from the Royal Navy, comprising 2,516 sets of observations, had been forwarded to Washington on the 30th ult.

SUBMITTED—The following STATEMENT respecting the RECORDS for December 1880, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868, and 20th November 1876).

——	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :— Action	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Indifferent.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ other causes	0	0	*24 hrs.	*25 hrs.	0	0	0	0	†1 hr.	†1 hr.	‡13 hrs.	0	0	0
Orientation verified	30th	—	31st	—	13th	—	31st	—	9th	—	24th,28th	—	20th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	1	2	5	11	0	1	2	0	1	2	2	0	6
Result of 40 *Remeasurements* :—														
Greatest difference	0·0	1·0	2·0	2·0	1·0	1·0	0·0	1·0	0·0	1·0	1·0	1·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·6	0·1	0·4	0·0	0·5	0·0	0·5	0·0	0·4	0·0	0·5	0·1	0·5
Residual difference (— Meteorological Office)	0·0	−0·1	+0·1	+0·1	0·0	+0·1	0·0	0·0	0·0	+0·2	0·0	+0·2	−0·1	+0·1
RAIN GAUGE :— Action	Good.		Good.		Indifferent.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0		0		0	
„ „ other causes	0		0		0		0		0		0		0	
Errors in tabulation	0		0		0		0		0		6		2	

BAROGRAPH:—													
Action	Good.		Good.		Good.		Good.		Good.		Good		Good.
Photography	Do.		Do.		Do.		Do.		Do.		Do.		Do.
Records deficient, due to stoppage of clock	0		0		2 hrs.		0		0		0		2 hrs.
„ „ failure of light	0		0		9 hrs.		0		1 hr.		0		3 hrs.
„ „ other causes	0		0		0		0		0		0		0
No. of errors discovered—													
In entry of standard	0		1		0		5		5		3		0
„ calculating residual correction	0		2		1		2		2		0		1
„ applying residual correction	0		1		0		9		0		0		0
„ subtraction in subsidiary tables	0		0		0		1		2		0		0
„ tabulation by subsidiaries	0		0		0		0		0		0		0
„ „ irregular differences	0		3		0		3		5		0		0
Result of 40 *Remeasurements:—*													
Greatest difference	0·005		0·010		0·006		0·005		0·004		0·005		0·005
Mean difference irrespective of sign	0·0016		0·0015		0·0024		0·0027		0·0017		0·0017		0·0023
Residual difference (— Meteorological Office)	−0·0004		+0·0011		+0·0012		−0·0003		−0·0002		−0·0001		−0·0004
Mean monthly difference between simultaneous barograph and barometer readings	0·0022		0·0025		0·0012		0·0018		0·0023		0·0015		0·0029
THERMOGRAPH:—													
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.
Photography	Do.		Do.		Do.		Do.		Do.		Do.		Do.
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	0	0	0	0	0	8 hrs.	9 hrs.	0	0
„ „ imperfectly moistened bulbs	—	11 hrs.	—	0	—	1 hr.	—	8 hrs.	—	14 hrs.	—	9 hrs.	—	0
„ „ partially frozen bulbs	—	45 hrs.	—	51 hrs.	—	0	—	33 hrs.	—	13 hrs.	—	16 hrs.	—	0
„ „ other causes	‖1 hr.	‖1 hr.	0	0	0	0	0	0	§1 hr.	§1 hr.	0	0	0	0
No. of errors discovered in entry of standard	0	0	0	0	0	0	1	0	1	2	0	1	0	0
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	1	2	0	2	3	3	2	3	0	1	1	2
„ „ detected under glass scale	2	0	4	1	5	2	0	5	2	11	0	0	3	3
Result of 40 *Remeasurements:—*														
Greatest difference	0·2	0·2	0·3	0·3	0·3	0·2	0·2	0·4	0·3	0·4	0·2	0·2	0·3	0·4
Mean difference irrespective of sign	0·11	0·09	0·13	0·10	0·12	0·11	0·08	0·10	0·10	0·14	0·05	0·10	0·13	0·12
Residual difference (— Meteorological Office)	−0·09	+0·4	+0·12	+0·08	−0·08	−0·04	+0·4	−0·10	−0·07	−0·12	−0·04	−0·02	+0·13	−0·04
Mean monthly difference between simultaneous thermograph and thermometer readings	0·11	0·12	0·17	0·15	0·06	0·10	0·19	0·17	0·11	0·14	0·12	0·15	0·14	0·14
No. of errors in maxima and minima	1	—	1	—	3	—	6	—	1	—	2	—	2	—

• Trace unreliable, the weight having dropped off the pendulum-rod. † Clamping-pin broken. ‡ Shaft geared to direction pencil got out of order during night. ‖ Changing curve. § Light out during repair to gas meter.

Read—The following letter:—

M.O. 987.

General Post Office,
London, May 27, 1881.

SIR,

MY attention has recently been called to the priority of transmission given to the telegrams containing weather reports sent from the provinces to the Meteorological Office in London. I am aware that the arrangement is one which has been in operation since the transfer of the telegraphs to this Department, but it is one for which there is no authority either in the Telegraph Act, 1863, or in the subsequent Act passed in 1868. The Department has recently had to decline priority of transmission of telegrams of an important character which did not come within the provisions of the two Acts referred to, and in these circumstances it cannot, I regret, consistently continue such an arrangement on behalf of the Meteorological Council. I have accordingly to give notice that when the "passes" recently sent to you have been used the privilege of priority of transmission to the weather reports in question will be withdrawn, and a new form of "pass," of which I enclose a specimen, introduced.

In the case of the weather reports despatched at 8 a.m. the change will, I feel sure, make no difference in the time occupied in transmission, because at that hour the wires are comparatively free from public message traffic, and as regards the reports sent at other periods of the day instructions will be given to ensure their being forwarded with every possible despatch.

I am, &c.

The Secretary, Meteorological Council. (Signed) C. H. B. PATEY.

The Secretary was instructed in acknowledging the letter to state that the Council regret the loss of the priority which has hitherto been accorded to their telegrams, and to add that, if the change should be found seriously to interfere with the times of arrival at the Office of the weather reports, and thus to cause inconvenience to the public or danger to seafaring people owing to delay in the issue and receipt of storm warnings, they would feel it their duty to call further attention to the matter.

Read—A memorandum from Captain Toynbee reporting that since the last meeting eight logs had been received, three of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. H. W. Dyke	Barque "Markland."	Jan. 8—May 16, 1881.	Belfast, Baltimore, and home.	1880, p. 90.
Capt. James Gordon	S.S. "City of Agra."	March 5—May 21, 1881.	London to Calcutta and home.	1880, p. 122.
Capt. E. W. Turner	Barque "Mertola"	Sept. 7, 1880—Mar. 9, 1881.	Liverpool to River Guadiana; three voyages.	1880, p. 54.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted—A specimen of the Weather Map issued by the Sydney Observatory (Letter 965).

Submitted—A memorandum from Mr. Strachan (Letter 1030) asking for a further grant in aid of the cost of the discussion of the data for Arctic Meteorology (Part III.) (Minutes, 1880, p. 40). The Council resolved to grant the sum of 30*l.* to Mr. Strachan for providing assistance in the work.

The proof of the Annual Report was further considered.

A draft of the Quarterly Weather Report, Part I., for 1876 (Minutes, 1880, p. 41) was submitted.

Submitted—The following reports:—

June 2, 1881.

STATEMENT of WORK done in the MARINE ROOM during May 1881.

New logs examined, 14.

Cape of Good Hope District.

Wind Charts.—Proofs of large charts for February, March, November, and December received and examined.

Preparing wind percentages for printing.

Current Charts.—Proofs of large Charts for May and September received and examined.

Notes for insertion on charts in preparation.
Cape Gales.—Correcting proof of letterpress for January.
January, Plate II., and April, Plates I. and III., prepared. January, Plate IV. in hand.
Obtaining means for October gales.
Notes for letterpress of Cape work in progress.
Explanations of methods followed in discussion of Marine Meteorology for Annual Report.

General.

Copying from Rough Book into Log No. 4942 observations not inserted by the captain.
Consideration of method of working barometer means for all oceans.
Posting index of data in Ocean 10° Squares.
Madagascar weather. Searching for information on this subject.
Mr. James assisting Lieutenant Baillie on sea temperature work throughout the month.

(Signed) CHAS. HARDING.
HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq., M.A.

May 31st, 1881.

STATEMENT of WORK done in the PANTAGRAPH ROOM during May 1881.

Copper Plates pantagraphed:—8 plates Nos. 54, 1876; Nos. 55 to 61, 1880.
Zinc Plates:—Barograms, 8 plates, Nos. 56 to 60, 1876, Nos. 65 to 67, 1880; Thermograms, 6 plates, Nos. 55 to 60, 1876; Vapour tension, 12 plates, Nos. 55 to 56, 1880; Anemograms, 7 plates, Nos. 61 to 67, 1880; Rain curves, 7 plates, Nos. 61 to 67, 1880.
Thermograms are prepared for pantographing to Plate 72, 1880, but the barograms are not in advance of the zinc plates.
Work was resumed with the Harmonic Analyser on the 9th, and since then the analysis of the Glasgow and Aberdeen temperature curves has been completed.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

Examination Room,
May 31, 1881.

THE following curves and tabulations have been examined since 30th April:—December: *Barograms*, two stations; *Anemograms*, seven stations. January: *Thermograms*, five stations; *Barograms*, four stations.
The notes of errors for the *December* work have also been written.

(Signed) T. E. ALLEN.

R. H. Scott, Esq.

Mr. Scott requested instructions as to the Hay Harvest Forecasts in the present year. It was resolved to make arrangements on the same plan as in the last two years.

The Secretary was instructed to request the Admiral Superintendent of Naval Reserves, and the English and Irish Lighthouse Boards, to continue the sea temperature observations round the coasts of the British Isles as in the two past years (Minutes, 1880, p. 15).

Resolved—That the sum of 15 guineas be given to Mr. Abercromby for his work in preparing a proposed treatise on the Types of Gales, &c. (Minutes, 1878, p. 78).

Submitted—The following report:—

PRELIMINARY REPORT on the PHOTO-NEPHOGRAPH.

The model photo-nephograph which I designed and submitted for the approval of the Council was manufactured in a practical form by the Cambridge Philosophical Instrument Company, under the superintendence of Mr. H. Darwin, who was also good enough to design an electrical shutter, by which two or more cameras would be exposed at the same moment for any required duration. Two cameras were completed at the beginning of the year, and, after some delay caused by necessary alterations, they were handed over to me for trial. The only drawback to them in any way that I can see at present, is the fact that to work the shutter four or five Le Clanché cells are required, which is a serious inconvenience when the cameras have to be transported any distance for work; it may prove necessary to re-wind the magnets.

My attention has been once more directed to the best photographic process to employ for the delineation of the clouds, a certain inconvenience having attached to the use of collodion-emulsion which at first I had not foreseen. I had then recourse to gelatine plates, but the manner in which they are ordinarily prepared induces a sensitiveness which becomes unmanageable even when a diaphragm with a small aperture is used in the lenses. The great desideratum in the plates appears to be that a small variation in the intensity of the light proceeding from the sky or cloud shall produce a great contrast in the intensity of the developed image. A very rapid plate does not

answer for this purpose, hence I tried several modifications. The process which at present has given the best results is as follows :—

150 grains of bromide of ammonium and 10 grains of iodide of potassium are dissolved in 3 oz. of water, to which 80 grains of Nelson's No. 1 photographic gelatine and 80 grains of Coignet's gelatine have been added. This is dissolved by the aid of heat, and 200 grains of nitrate of silver dissolved in 1½ oz. of water are added. The whole is warmed to 100° F. for five minutes, and allowed to set after being poured out in a flat dish. The emulsion thus produced is washed (in the usual manner) from the soluble salts, and is then remelted and plates coated and dried as is customary in the gelatine process.

This formula gives very constant results, and great contrasts of image are obtained by careful development.

The first point to which attention in the cameras was required was to find the errors which might arise from faulty construction. It will be recollected that in principle the instrument is a theodolite, in which the telescope is replaced by a camera and a lens, and the eye-piece by a sensitive plate. In front of the sensitive plate, in fact in contact with it, is a piece of transparent glass attached to a slide, on which are ruled two cross lines. For each slide the intersection of three cross-lines is a fiducial point from which measurements have to be made. As there are three slides to each camera, the error in position of the intersection of the cross-lines had to be determined.

Owing to the limited space at my disposal, I have taken the instruments down to the School of Military Engineering, Chatham, and by the kind co-operation of Lieutenant Darwin, R.E., their errors have been determined there. For both cameras the errors in azimuth are so small as to be quite negligeable. The corrections for zenith distances are as follows :—

Camera A.		Camera B.	
Slide I.	+ 16′	Slide I.	+ 3′
Slide II.	+ 13′	Slide II.	+ 7′
Slide III.	+ 13′	Slide III.	+ 7′

These small errors speak well for the care with which the instruments have been constructed.

The next point to determine was the accuracy of the instruments in determining distances; and here I may say, that the results obtained are very favourable. A base line of 200 yards was taken and photographs of a distant landscape taken from each end, and the distances calculated for prominent points.

As an example, the spire of a church was one of the objects selected, and the calculated distance was 3,040 yards from camera A. Measuring the distance on the 6-inch map, the true distance proved to be 3,070 yards, and the error would have been reduced had some slight corrections been made with which I am now acquainted.

Regarding the recognition of points in a cloud, I think there is not much difficulty. For example in the measurement of the height of clouds, one edge gave a height of 2,050 feet, and the opposite edge gave 2,070 feet, a difference which would not materially affect the general results. The instruments can be perfectly well applied to clouds within a zenith distance of 60°, and there will be no difficulty, as far as I can see, in finding which is the lowest point of a cloud.

I propose to carry on experiments during the summer, as far as my time will allow, and I trust that by the fall of the year the operations will have gone beyond the experimental stage, and have reached such a practical state as to admit of regular observations being made. I have not as yet paid much attention to the velocity and direction of clouds. The few experiments made indicate that no difficulty should be met with supposing two exposures are made within a short interval of time; that it to say, an exposure must be made from each end of a base line simultaneously, and another made from one end to ascertain the displacement of the cloud after some short interval of time. This will give the velocity and direction supposing the magnetic bearing of the base line is known.

(Signed) W. DE W. ABNEY.

Submitted—The following report :—

62, Camden Square, London, N.W.,
May 24, 1881.

DEAR MR. SCOTT,

IN reply to your inquiry I am happy to be able to say that the rainfall tables for your Council are in a very forward state, and I have no doubt that they will be delivered complete at your Office on the date originally named, July 1st, 1881.

I cannot yet say decidedly what the total number of returns will be, but probably more than 350, as the number of those stations (in the list sent you in April 1880) which have broken down in 1880 is much less than I expected, and, on the other hand, I have obtained several valuable long registers since that list was compiled, and those I intend to add.

As a specimen I enclose return from one station, the first in the order of sequence adopted in my own publication *British Rainfall*. I shall deliver the sheets in the order of the list already sent to you, but it would be for the Council to decide in what grouping they would have them published. Possibly they may like to consider this at once, so that when the MS. is delivered to you it may be sent to the printer without delay.

Yours, &c.

G. J. SYMONS.

R. H. Scott, Esq., M.A., F.R.S.,
Sec. Met. Council.

STATION—Hampton Wick, The Grove.
COUNTY—Middlesex.

OBSERVER—Sir T. J. Nelson.

LAT.: 51° 25′ N.
LON.: 0° 19′ W.

RAIN GAUGE { Diameter—5 inches. Height above ground—1 ft. 1 in. „ „ Sea level—27 ft.

Year.	Monthly Rainfall, in Inches.												Total.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
1866 -	2·61	3·98	1·34	1·80	1·35	3·73	2·19	2·35	3·42	1·51	1·47	1·98	27·73
1867 -	2·85	1·53	1·57	1·91	1·36	1·79	4·30	2·66	2·25	1·87	·70	1·38	24·17
1868 -	3·58	·53	1·57	1·44	1·66	·37	2·15	2·39	1·09	2·35	1·21	4·87	23·21
1869 -	2·32	2·46	1·15	1·12	3·05	1·35	·89	1·42	3·74	1·59	2·21	2·46	23·76
1870 -	1·13	1·37	2·01	·11	·78	·47	·94	2·66	1·47	3·06	1·30	2·51	17·81
Total -	12·49	9·87	7·64	6·38	8·20	7·71	10·47	11·48	11·97	10·38	6·89	13·20	116·68
Mean -	2·498	1·974	1·528	1·276	1·640	1·542	2·094	2·296	2·394	2·076	1·378	2·640	23·336
1871 -	1·94	·86	1·08	3·01	·87	3·45	3·75	·79	4·46	·83	·55	1·16	22·75
1872 -	3·70	·78	1·62	·98	2·91	2·25	1·42	1·25	1·35	4·46	3·63	3·69	28·04
1873 -	2·42	1·51	3·16	·62	1·41	1·51	2·89	1·77	2·43	3·00	1·69	·98	23·39
1874 -	·99	1·18	·45	1·53	·35	2·35	1·32	1·34	2·94	3·92	1·59	1·98	19·94
1875 -	3·25	·99	·49	1·48	1·13	2·12	4·70	·38	1·12	3·78	2·94	·98	23·27
Total -	12·30	5·23	6·80	7·62	6·67	11·68	14·08	5·53	12·30	15·99	10·40	8·79	117·39
Mean -	2·460	1·046	1·360	1·524	1·334	2·336	2·816	1·106	2·460	3·198	2·080	1·758	23·478
1876 -	·76	1·93	2·73	1·87	1·31	1·50	1·14	2·44	2·58	1·55	2·53	5·08	25·42
1877 -	4·75	2·03	2·36	3·11	2·25	2·60	2·31	3·15	·89	1·81	3·73	1·56	30·55
1878 -	1·22	1·16	·52	2·76	3·42	1·94	1·54	4·82	1·01	1·69	3·01	1·63	24·72
1879 -	2·37	3·37	·67	2·98	3·66	4·23	3·60	4·97	3·15	·61	·69	·55	30·85
1880 -	·42	1·96	·30	1·96	·27	2·90	5·77	·62	4·33	5·30	1·69	3·01	28·53
Total -	9·52	10·45	6·58	12·68	10·91	13·17	14·36	16·00	11·96	10·96	11·65	11·83	140·07
Mean -	1·904	2·090	1·316	2·536	2·182	2·634	2·872	3·200	2·392	2·192	2·330	2·366	28·014

The following cheques for May were drawn on the 31st of that month :—

	£	s.	d.	£	s.	d.
Administration:						
R. H. Scott, Secretary - - -	-		-	66	13	4
J. S. Harding, jun. } Salaries and wages - -	27	15	6			
T. D. Bell - }	13	6	8			
J. S. Harding, sen. }	*8	19	8			
				50	1	10
Pall Mall Coal Company, coals - -	-		-	2	4	0
M. D. Hodges, paper - - - -	-		-	2	1	8
Cashiers, Bank of England o/a Stationery Office	-		-	10	11	9
Keller, Wallis, & Postlethwaite, freight -	-		-	0	13	3
Pickford & Co., carriage of parcels - -	-		-	1	5	9
Special Researches:						
Hon. R. Abercromby, revision of barometer manual	-		-	15	15	0
B. M. Allingham, extraction of fog observations	-		-	2	2	0
F. O. R. Goetze, hygrometer - - -	-		-	1	7	0
G. J. Symons, rainfall values - - -	-		-	100	0	0
Land Meteorology:						
J. E. Cullum, salary - - - -	-		-	16	13	4
Hopkin & Williams, chemicals - - -	-		-	8	11	2
R. H. Curtis - }	22	4	5			
J. A. Curtis - }	15	11	1			
T. E. Allen - } Discussion, &c. of Observations.	15	11	1			
C. H. Thompson - }	*9	4	0			
E. G. Aldridge - }	*7	6	8			
				69	17	3
Carried forward - - -				£347	4	0

* Four weeks ending 28th May.

		£	s.	d.	£	s.	d.
	Brought forward -	-		-	347	4	0
Weather Information and Forecasts:							
Postmaster General, telegrams - -		-		-	246	6	1
Wightman & Co., printing and wrappers -		-		-	26	9	0
F. Gaster -	Preparation &c. of Weather Reports.	29	1	6			
W. L. Dallas -		21	9	1			
F. Brodie -		20	12	1			
H. W. Chivers -		*6	12	0			
					77	14	8
For Ocean Meteorology:							
Capt. H. Toynbee -	Discussion, &c. of observations, and care of instruments.	33	6	8			
R. Strachan - -		27	15	6			
C. Harding - -		22	4	5			
H. Harries - -		*11	4	0			
Lieut. C. W. Baillie, R.N.		16	13	4			
					111	3	11
C. H. Grey, freight - - - -		-		-	1	17	9
Negretti & Zambra "A" Instruments - -		59	4	1			
„ „ "B.T." „ - -		37	7	0			
„ „ Rain-gauges for Cyprus -		12	0	0			
					108	11	1
Miscellaneous:							
W. Allingham, commissions - - -		-		-	3	5	5
R. J. Lecky „ - - -		-		-	20	10	0
Negretti & Zambra „ - - -		-		-	203	3	0
J. S. Harding, jun., petty cash - - -		100	0	0			
„ „ - - -		80	0	0			
					180	0	0
					£1,326	18	3

* Four weeks ending 28th May.

116, *Victoria Street, June* 15, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (June 2) were read and confirmed.

The Annual Report was approved, and the Chairman was requested to forward it to the Royal Society.

The following letter (No. 1263) to the Colonial Office was approved, and the Secretary was instructed to forward it with a copy of the précis printed on last Minutes:—

SIR,

IN reply to your letter of the 25th of May last, I am instructed to state that the Council of this Office have duly considered the report of Mr. Maxwell Hall on "the progress of the scheme for "the establishment of a central meteorological observatory in Jamaica." The Council still adhere to the opinion which they have expressed in former communications to the Colonial Office, that the establishment of a meteorological system in the West Indies and of a central observatory in connexion therewith would be of great benefit to those Colonies, and would tend to the advancement of meteorological science.

They are also still of opinion that, with a view of giving early warning of the approach of hurricanes, the best situation for a central observatory would be in one of the eastward islands, and they suggested Antigua as suitable for the purpose.

But as this suggestion has not been met with sufficient support in the West Indian Colonies generally, the Council think, in agreement with Mr. Maxwell Hall, that the existing organisation in Jamaica would be, at least at present, the best available centre for the development of a meteorological system.

They consider that Mr. Maxwell Hall's report gives evidence of very praiseworthy activity on his part, and they hope that the assistance which he at present receives from the Government of Jamaica may be continued, and that further support may be obtained from the other islands.

The Council are not surprised at the delay which Mr. Hall has experienced in his recent communications with the Chief Signal Office of the United States, as on the death of General Myer important changes, which are not yet complete, were introduced into the organisation of that office.

The Secretary reported that no reply had been received from the Government of Fiji to his letter (No. 1892, 1880), as to the establishment of meteorological stations in that part of the Pacific (Minutes, 1880, p. 41). He was instructed to write again to the Colonial Government on the subject (Letter 1284).

Reported—That a letter (No. 1116) had been written to the Post Office as directed at last meeting.

Read—The following letter (Minutes, 1878, p. 67):—

M.O. 1058. Board of Trade (Harbour Department),

SIR, Whitehall Gardens, S.W., June 7, 1881.

I AM directed by the Board of Trade to call attention to previous correspondence in connexion with the proposed erection of wind vanes at certain lighthouses in the jurisdiction of the Corporation of Trinity House.

Your letter on this subject of the 12th November 1878 suggested objections to the form of instrument proposed to be adopted by the Corporation, and suggested that a record of direction, of force, and of sudden gusts of wind would be desirable.

From the communication, however, now received from the Elder Brethren, copy of which is herewith, it will be seen that the Corporation propose at once to proceed to the erection of such simpler contrivances as they think sufficient for the needs of their service.

It is proposed to sanction the outlay referred to in the Trinity House letter; but, before this is done, the Board desire me to say that, while they regard the simpler vanes proposed as sufficient for lighthouse requirements, it has occurred to them that the Meteorological Office might wish to place the more complex instruments suited to record the more exact information indicated in your letter above referred to at some out of the 28 stations named in the accompanying list.

I am to inquire whether the Meteorological Office have such a desire, and whether, if so, they would be willing to contribute the additional expense.

Should the Meteorological Council desire to obtain regular wind observations at any of these points of the coast it would obviously be a pity to set up the cheaper and less perfect instrument in a position where the more expensive instrument would have to be erected hereafter.

I am, &c.

The Secretary to the Meteorological Council, (Signed) C. CECIL TREVOR.
116, Victoria Street, S.W.

M.O. 1058.

SIR, Trinity House, London, E.C., May 25, 1881.

WITH reference to your letter, H. 7208, dated 25th November 1878, and to the provision which has been made in the annual estimates since that time for the fitment of certain lighthouses with wind tell-tales, I am directed to acquaint you, for the information of the Board of Trade, that, as suggested in your letter above quoted, the Corporation placed themselves in communication with the Meteorological Council on the subject. No decision has, however, been arrived at by that Department as to the exact description of instrument which would best answer their purposes, and the Board have again had regard to the desirability of proceeding with the fitment of the simple contrivance which will meet their own requirements, in order that the records kept by the keepers as required by the regulations of the service may be accurate and trustworthy. At present the keepers form their own opinion as to the wind's direction, the four cardinal points being laid down for them, but not the intermediate divisions. For the want of means to form an accurate judgment grave discrepancies occur at times between the records of lights compared with each other or with those of neighbouring coastguard stations. The records are useful in determining questions of prevailing winds, fogs, &c., as affecting the establishment of new lights or buoys, and at fog-signal stations especially they are required for determining the direction in which the horn should be pointed during fog. Besides these service needs, which would be sufficient in themselves to induce the Elder Brethren to seek greater accuracy than can be obtained at present, it is found that the records are frequently called for as evidence in courts of justice, and it is discreditable to the service to find, as is sometimes the case, that they are of doubtful value. It is therefore proposed gradually to cause the following 28 stations, which have been named by the inspecting committees of the past year as most in need of the article, to be provided with a wind tell-tale of the description

which has been found to answer so well at the South Foreland, and to the expenditure involved, which will amount on the average to about 9*l.* per station, and not 7*l.*, as previously stated, or 252*l.* in all. I am accordingly to request statutory sanction.

I am, &c.
(Signed) J. INGLIS.

The Assistant Secretary, Harbour Department,
Board of Trade, S.W.

STATIONS recommended to be FITTED with WIND TELL-TALES.

Longstone.	S. Foreland.	South Bishop.
Tinmouth.	Dungeness.	Bardsey.
Flambro'.	Beachy Head.	St. Tudwals.
Spurn (High).	St. Catherines.	Skerries.
Cromer.	Portland (Low).	Menai.
Lowestoft (Low).	Wolf Rock.	Air.
Orford (High).	Godrevy.	South Stack (High).
Landguard.	Lundy.	Holyhead Breakwater.
Dovercourt.	Flatholm.	St. Bees.
N. Foreland.		

The Secretary was instructed to send the following reply (No. 1283):—

M.O. 1058.

Meteorological Office.

SIR,

IN reply to your letter of the 7th June, I am requested to state that the Meteorological Council are not as yet in a position to recommend any instrument which, while indicating with sufficient accuracy the direction and force of the wind, could be erected *at a moderate cost* under the conditions admissible in a lighthouse. They therefore think it very desirable that the arrangement proposed by the Trinity House, which must afford valuable, if incomplete, information, should be at once carried into effect without waiting for any further communication from this Office.

The Meteorological Council are still endeavouring to obtain a pattern of anemometer and wind-direction recorder which might at once be inexpensive and be suitable for lighthouses. As soon as they are in possession of a satisfactory instrument, they will apply to the Trinity House for leave to employ it in one or more lighthouses.

I am, &c.
(Signed) R. H. SCOTT,
Secretary.

The Assistant Secretary,
Harbour Department, Board of Trade.

The Chairman submitted the following letter:—

M.O. 1032.

Scottish Meteorological Society, Albert Buildings,
6, Shandwick Place, Edinburgh, June 2, 1881.

MY DEAR SIR,

I ENCLOSE copy of a memorial from our Council asking from the Treasury the services of three men as an observing staff for the proposed observatory on Ben Nevis, about which we had some conversation in March. The memorial is sent to our President (the Duke of Richmond and Gordon) for presentation by his Grace. As soon as we are informed that it has been presented, our honorary secretary is instructed to send copies of it to the Royal Society and the Meteorological Council that you may know of the action. Be so good as to treat the memorial now sent in the meantime as a private document.

Mr. Wragge was here on Thursday and Friday last and received very full instructions regarding the carriage and placing of the instruments on Ben Nevis, and I am happy to say that the barometer and other instruments have all been conveyed safely to the top of the Ben, and temporarily (but securely) placed, and to-day is the second day on which the observations have been made at 9 a.m. 4,406 feet above the sea!

A strong protecting cage, so strong as to stand weather such as it is prudent to provide against, and meddling by tourists, and sufficiently open to wind and weather by wire-netting of a wide mesh, is being made, and will be despatched from Edinburgh to Fort William in the end of the week. This cage has a provision for doing a little anemometrical observing. During the half hour Wragge is at the top, a cup-anemometer will be pulled up to the top of a pole, and its revolutions recorded at the end of the half hour as one of the daily observations. Among extra observations, Wragge will read his pocket aneroid, (noting the time) on his way to and from the top on entering or emerging from cloud or mist, and in encountering any sudden changes of weather, such as in direction or force of wind.

A copy of the Ben Nevis observations will be forwarded to the Meteorological Office as we receive them, and I am desired by the Council to say that if they are wished in connection with framing the Daily Weather Forecasts, Mr. Wragge can telegraph them daily to Victoria Street on his return to Fort William about 2–3 p.m.

Yours, &c.
(Signed) ALEXANDER BUCHAN.

Professor H. J. S. Smith.

MEMORIAL to the LORDS COMMISSIONERS of HER MAJESTY'S TREASURY from the COUNCIL of the SCOTTISH METEOROLOGICAL SOCIETY.

A strong and wide-spread feeling has arisen within the last few years as to the necessity of High-level Meteorological Stations, with the view of furnishing data for the elucidation of the great movements of the atmosphere, on a correct knowledge of which the forecasting of weather and of the character of coming seasons so much depends.

A great deal has been done in establishing such stations in other countries; and the Governments of the United States, France, Switzerland, Italy, Austria, Germany, and other countries have given liberal assistance in establishing these stations.

In the British Islands no High-level station exists, the highest being Dalnaspidal, in Perthshire, 1,450 feet above the sea. While this and similar stations are of great value in the discussion of many atmospheric problems, they do not rise to a height entitling them to be classed as High-level stations, and they do not furnish the data required in the discussion of those important weather problems for the examination of which High-level stations are established.

This desideratum in our British Meteorology is the more serious when it is considered that the British Islands lie in the heart, so to speak, of the south-westerly winds from the Atlantic, which, beyond all question, are the predominating influences ruling the weather of these islands and of a large portion of the continent of Europe. Indeed, unless a really High-level station be established in the British Islands, the observations made at continental High-level stations are shorn of much of their value as regards all inquiries affecting the great movements of the atmosphere.

It was this conviction which induced the Scottish Meteorological Society at the suggestion of Mr. Milne Home, Chairman of the Council, to propose in 1877 the erection of a Meteorological station on the top of Ben Nevis, 4,406 feet above the sea, a situation which has the additional recommendation of being situated in the north-west of the British Islands, facing the Atlantic, and of rising considerably higher into the atmosphere than any other mountain nearer than the mountains of Scandinavia, Switzerland, and France.

To aid in the erection of the building, the Council applied for a grant from the Research Fund Committee, who, though unable to afford the assistance asked for, passed a resolution cordially approving of the proposal to erect a Meteorological station on Ben Nevis, "as an object of national importance."

Mr. T. Stevenson, the Society's Honorary Secretary, prepared plans of buildings in 1878, and offers were obtained from contractors, from which it was seen that the amount required was entirely beyond the resources of the Society. It was also apparent that an Observing staff of three men would be required for making the observations.

The Council received a letter from Professor H. J. Stephen Smith, Chairman of the Meteorological Council in 1878, placing at their disposal an annual grant of 100*l.* towards the maintenance of an Observatory on Ben Nevis, on condition that the Meteorological Council be supplied with copies of the observations.

Last autumn a committee was formed for the purpose of raising a testimonial to David Hutchison, Esq., who did so much to develope the resources of the West Highlands with his steamers; and in February last a letter was received by the Council of the Society from the Honorary Secretary of that Committee, offering to build an Observatory on the top of Ben Nevis, and hand it over to the Scottish Meteorological Society, on condition that the Council would accept it and work it as part of their system.

To this proposal the Council replied, February 25, 1881, accepting the offer on the conditions proposed, but adding that "It will be clearly understood that the maintenance of such a station is "beyond the funds of the Society, and that the expense will have to be met from other sources, "and that, as the annual cost of maintenance will be from 250*l.* to 300*l.*, the Council of the Society "shall apply to Government for assistance, and make any other efforts that may be desirable to "accomplish this object, which they have so very deeply at heart."

Since this correspondence, the Council had begun the establishment of this important work. It has secured the services of a competent Observer for the purpose of making *preliminary* observations during the ensuing summer, and has provided instruments with a protecting cage. The Council expect to be in a position to be able even this summer to send Daily Weather Telegrams to the Meteorological Office in London.

Under these circumstances, the Council of the Scottish Meteorological Society venture respectfully to inquire whether, when the station has been built and handed over to the Society, Her Majesty's Treasury would be pleased, in the interests of science and British commerce, to assist the Society in carrying out this important object, by authorising the War Office to place at the disposal of the Council three men to form the observing staff of this observatory for a period of five years, in order to ascertain the value of observations made at high levels—(1) in elucidating the general laws of atmospheric circulation, and (2) in forecasting weather for the benefit of navigation and agriculture.

(Signed) D. MILNE HOME,
Chairman of Council.

Scottish Meteorological Society,
Albert Buildings 6, Shandwick Place, Edinburgh,
May 31, 1881.

Mr. Scott stated, with reference to the last paragraph but one of the memorial, that he had heard from Mr. Wragge (Letter 1057) that he expected to be able to hand in

the telegrams at Fort William by 5 p.m. daily, and that accordingly these could be utilized in the preparation of the 8h. 30m. p.m. forecast.

Mr. Scott was instructed to write to Mr. Buchan in reply to the foregoing letter to the Chairman, and inform him that the Council would wish to receive daily telegrams from Ben Nevis, and would be glad to be informed from time to time of the progress of the negotiations with regard to the establishment of the Observatory (Letter 1181).

With regard to the letter from the Chief Signal Officer, Washington (Minutes, p. 17), the Secretary was instructed to acknowledge, with thanks, the receipt of the circular and accompanying chart, and to inform General Hazen that the Council are glad to be informed of the course proposed to be taken, but have no observations to offer on the subject.

M.O. 1046. Meteorological Office, 116, Victoria Street,
London, S.W., June 4, 1881.

SIR,

IN accordance with the instructions given to me by the Council (see Minutes for 1880–81, p. 16), I beg to hand you, for their consideration, the letterpress and diagrams relating to the Gales experienced in the sea adjacent to the Cape of Good Hope during January. I have also examined and classified, according to their direction, the rough diagrams of April and October, so that they are ready to be dealt with when the Council have decided on the method to be followed.

Yours, &c.

R. H. Scott, Esq., F.R.S., Secretary, Meteorological Council.

(Signed) HENRY TOYNBEE, Marine Superintendent.

Resolved—That Captain Toynbee's report on the Cape Gales for the months of January and July be published, with an introduction stating (1) that the discussion for two typical months had been considered sufficient; and (2) that the preparation of the work, referring as it does to a considerable extent to technical matters of seamanship, had been left by the Council entirely in the hands of Captain Toynbee; a précis of the conclusions arrived at to be also appended to the draft now submitted.

Read—A memorandum from Captain Toynbee, reporting that since the last meeting ten logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Captain S. B. Gray	"Letterewe" -	Sept. 10, 1880—May 27, 1881.	To Adelaide and home -	1880, p. 54.
Captain J. Raeburn, R.N.R.	"Lochee" -	Oct. 14, 1880—June 5, 1881.	London, Calcutta, and home.	1880, p. 54.
Captain C. H. Renaut	"Pleione" -	Feb. 2—May 20, 1881.	New Zealand and home -	1880, p. 40.
Captain J. W. Thorne	"British Commodore."	July 18, 1880—April 21, 1881.	Liverpool to Calcutta and New York.	1880, p. 40.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Reported—That Mr. H. Green had been appointed to a clerkship in the Savings Bank Department of the General Post Office, and had sent in his resignation to Mr. Scott.

Submitted—The following report:—

AD-INTERIM REPORT on the OBSERVATION of CLOUDS of the "CIRRUS" TYPE.

R. H. Scott, Esq.

In the course of the year an experiment has been made, by direction of the Council (see Minutes, 1879, p. 137), in order to ascertain how far observation of the movements of the highest forms of clouds may be rendered useful in the preparation of forecasts. This work was undertaken at the suggestion of the Rev. W. C. Ley, and a code for the transmission of the information having been devised, the system was brought into operation on the 1st April 1880, and has been continued ever since.

Observations are made at—

Valencia, by J. E. Cullum, The Observatory.
Mullaghmore, by K. Kerr, Coastguard Officer.
Lutterworth, by Rev. W. C. Ley, M.A., F.M.S.
Torquay, by E. E. Glyde, F.M.S.
London, by F. Gaster, F.M.S., Meteorological Office.

The information forwarded consists of a statement as to —

(1.) The precise form of the upper cloud observed;

(2.) Its amount;

(3.) The precise direction whence it is moving;

(4.) The estimated rate of its apparent angular motion (*i.e.* whether stationary, moving slowly, moving with moderate rapidity, or with unusual rapidity);

(5.) The point on the horizon from which the cloud appears to radiate.

When the clouds appear in a bank on the horizon, there is added—

(6.) The bearing of the middle of the bank;

(7.) An estimate of the density of the bank.

The direction and force of the surface wind current and the weather prevailing at the time of observation are also stated.

The information from Lutterworth and Torquay is usually transmitted by post, but the observers at those stations have authority to send their observations to the Office by telegraph whenever they are of opinion that the appearance and motion of the clouds threaten the advent of stormy weather. At Mullaghmore and Valencia the observations are added to one of the three telegraphic reports which are transmitted to the Office daily.

Owing to the nature of their other duties the observers at Valencia, Mullaghmore, and London are not able to watch the appearance and movements of clouds with the same constancy as those at Lutterworth and Torquay; and as it requires some considerable experience to enable an observer to estimate cloud motion with accuracy the earlier observations from the three former stations were in some respects less satisfactory than those made later. Partly for this reason, and partly because the indications furnished by the upper clouds are more complex and therefore more difficult to interpret during the close thundery weather of summer than during the winter time, and partly because the aid which the observations afford is of much greater value during the prevalence of our winter gales than during merely squally weather, the examination of these records has, for the present, been confined to the observations made during the six months which ended on March 31st, 1881.

The first step taken has been to group together all those instances in which cirrus clouds were observed to be moving from certain definite points, and in doing this the values have been referred to each alternate point of the compass. Each group is then carefully examined and compared with the weather subsequently felt, and the observations are sub-divided into separate sets, depending on the existence, or not, of a "*bank*" of clouds, on the distribution of pressure at the time, &c., as it is found that the mere fact that cirrus cloud is observed to be moving from *any* given point is, *taken alone*, an observation of no value whatever.

The examination has not as yet been completed, and it would at the present stage be premature to give any detailed statement of the probable results of the investigation. But sufficient experience has been already gained to make it safe to say that a well-organised system of cirrus observations, made by carefully trained observers, would be of great value in the preparation of forecasts and storm warnings. The observations have often been of material assistance by indicating the approach of depressions from the Atlantic; and used by an expert observer like Mr. Ley they have rendered possible the preparation of occasional forecasts of singular accuracy, with no other information than that derived from his own barometer and thermometers, and from the Daily Weather Report of the previous day. Instances of this occurred on October 4, 21; November 9, 18, 22; December 2, 21, 23, 26; January 11, 17; February 9, 12; and March 3, 18, 22. Less important changes were fairly accurately predicted on October 18, and December 20; while, on the other hand, on two days only were erroneous or quite useless forecasts prepared by him, December 28 and March 14.

A fuller report on the subject will be submitted to the Council as soon as possible.

(Signed) FREDC. GASTER.

Meteorological Office, 8th June 1881.

116, *Victoria Street, June* 30, 1881.

PRESENT:
PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (June 15) were read and confirmed.

Read—The following letter :—

SIR, Downing Street, June 21, 1881.

I AM directed by the Earl of Kimberley to transmit to you a copy of a dispatch (No. 192, 4th May, enclosed in original) from the Lieut.-Governor of Mauritius, forwarding Synoptic Weather Charts of the Indian Ocean for the month of February 1861, prepared by the Mauritius Meteorological Society.

Lord Kimberley would be glad to be informed whether, in your opinion, the publication of charts of this description is likely to be of value in the interests of navigation or science, and to receive any suggestions which you may have to offer for the assistance of the Colonial Society in their undertaking.

I am, &c.

R. H. Scott, Esq., F.R.S. (Signed) ROBERT G. W. HERBERT.

LIEUT.-GOVERNOR BROOME to THE EARL OF KIMBERLEY.

Mauritius, No. 192.

MY LORD, Government House, Mauritius, May 4, 1881.

I HAVE the honour to forward for your Lordship's information, copies of my minute (Enclosure I., not printed here) to the Council of Government, dated the 3rd instant, and of a memorandum (Enclosure II.) by the director of the observatory (Dr. Meldrum, F.R.S.) on the subject of weather charts of the Indian Ocean now in course of preparation by the Meteorological Society of Mauritius.

2. I believe that competent authorities have stated that these charts are likely to be very valuable in the interests and service of general science and navigation. The whole cost of their preparation and issue is estimated at Rs. 30,000, towards which sum the Mauritius Government has contributed Rs. 5,000 and other subscribers about Rs. 2,000.

3. In order that the undertaking, which is clearly beyond the limited means which either the local Government or the Meteorological Society can devote to such a purpose, may not fall through, I venture to suggest that your Lordship should bring this despatch and the enclosed papers to the notice of the Board of Trade and the Admiralty, with the view of perhaps inducing these departments of Her Majesty's Government to aid an undertaking which cannot fail to be serviceable to the interests they represent. The Kew Meteorological Committee might also feel inclined to ascertain whether foreign Governments and societies would not support the work.

4. The aid which is requested might take the shape either of donations of money or of subscriptions for a considerable number of the charts.

5. Copies of the charts already issued are enclosed. They show the weather in the Indian Ocean during February 1861, and similar charts for January and March 1861 are ready, and will shortly be issued.

I have, &c.

The Right Hon. The Earl of Kimberley, (Signed) F. NAPIER BROOME.
&c. &c. &c.

WEATHER CHARTS and STORM ATLAS of the INDIAN OCEAN.

1. During the last 30 years, the Meteorological Society of Mauritius has been tabulating the observations recorded in the log-books of vessels arriving at Port Louis, and a large body of information has thus been amassed relating to the direction and force of the wind, the pressure and temperature of the air, the currents and state of the sea, &c., in all kinds of weather, over the navigated parts of the Indian Ocean, from latitude 20° N. to latitude 46° S., and from the meridian of Greenwich to longitude 120° E.

2. There are two classes of registers. In one of these, called "Journals," are tabulated, for the same day, and for each hour at which observations were made, from midnight to midnight, the positions of the vessels, the direction and force of the wind, the readings of the barometer and thermometer, the character of the clouds and weather, and the sets and rates of the currents, with remarks on the veerings and shifts of the wind, the state of the sea, &c. In the other class of

of registers, called "Storm Books," is given detailed information, often comprising hourly or half-hourly observations, regarding gales and hurricanes.

3. The observations are considerably more numerous in some years than in others. In 1861, for example, which was a year remarkable for hurricanes, 24,998 observations were tabulated, giving an average of 68 observations of 24 hours each for every day (*sic*).

4. It has been resolved to endeavour to utilise these observations by preparing and publishing:—

1°. Daily Synoptic Weather Charts of the Indian Ocean for a whole year, showing, as far as possible, the direction and force of the wind, the temperature and pressure of the air, and the state of the weather and sea, at a certain moment of absolute time on each day;

2°. Charts showing the normal winds and weather, the mean temperature and pressure of the air, and the average limits of the trade winds, monsoons, and variables, in the months of January, April, July, and October;

3°. A Storm Atlas, showing, in a series of charts, the principal results obtained respecting the more remarkable atmospheric disturbances in the Indian Ocean since 1847, such as the tracks, courses, and extent of tropical hurricanes, north and south of the equator, and of extra-tropical gales, between the parallels of 30° S. and 46° S., for each year; the directions and force of the wind, the state of the weather and sea, the isotherms, and isobars, in a few typical cyclones, at a certain hour on each day, throughout their duration; and the connexion of such cyclones with the prevailing winds.

5. With regard to the utility of Daily Synoptic Weather Charts, it is generally admitted that simultaneous observations, over wide areas, are the best means for obtaining an insight into the laws of weather changes. Some persons, whose opinion in such matters is entitled to great weight, consider that all that is required for ordinary seamen is a simple *resumé* of results. And that may be very true. But to many others no statement of results can be so satisfactory as daily or hourly details presented in a graphic form. The mere enunciation of results, for the benefit of practical men, is not much calculated to advance Meteorology, as a science. If the details are accessible to only a few, investigation is crippled, and progress retarded. The highest authorities, therefore, have recommended the synchronous method. In a letter dated February 16, 1876, addressed to the late Sir William Stirling Maxwell, as Chairman of a Treasury Committee on the Meteorological Office, London, the President and Council of the Royal Society stated that the preparation and publication of Weather Charts were "eminently worthy of the support of the Government," and distinguished Meteorologists of different countries have expressed similar opinions. The Government of the United States of America, in particular, has expended large sums on synoptic work.*

6. A large mass of materials being available, it is considered that the charts of averages should be for periods not exceeding one month. This, it is believed, would be an improvement upon most of the similar charts now extant, which, however valuable and interesting, give averages for only each quarter. January, April, July, and October are selected, as a commencement, because in those months the effects of season are strongly marked.

7. An Atlas, giving in a series of charts, accompanied with letter-press, the results of numerous observations relating to storms and hurricanes in the Indian Ocean during more than 30 years, could not, it is thought, fail to be of practical utility to seamen, and interesting to others, showing, as it would do, among other things, the tracks, extent, duration, &c. of upwards of 200 tropical cyclones, in the space between the equator and 30° S. alone, the circumstances under which they began, existed, and ended, and the meteorological conditions which then existed at Mauritius.

8. The following portions of the work have been completed, viz., Synoptic Weather Charts for January, February, and March, 1861, and the Tracks of Cyclones, south of the equator, from 1855 to 1880. Some of the remaining portions are well advanced.

9. A copy of the Charts for February 1861, is forwarded herewith, as a specimen of the synoptic part of the work.

These charts, which were lithographed by Messrs. W. and A. K. Johnston, Edinburgh, are based upon observations made on board nearly 200 vessels, and they show the state of the winds, weather, &c. at noon on each day, the meridian of 60° E. being adopted as the first meridian. Most of the observations were collected at Mauritius, and nearly all the rest obtained from the Meteorological Office, London.

The directions of the wind have been corrected for magnetic variation, the observations of the barometer and thermometer reduced, observations evidently erroneous rejected, and every possible care taken to insure accuracy, without regard to theories or hypotheses, the sole object being to give a faithful representation of facts.

Isothermal and isobaric lines might have been freely drawn all over the Ocean, but this has only been attempted when it was fully justified by the observations. The pressure and temperature of the air, however, at noon, are given numerically.

The chief characteristics for each day are briefly stated in the "Remarks" at the upper left-hand corners of the charts.

It will be seen that two severe cyclones raged simultaneously for several days, between the N.W. monsoon and the S.E. trade-wind, and that frequently there were alternate areas of high and low

* For examples of the utility of synchronous observations, see "Weather Charts and Storm Warnings" by Robert H. Scott, M.A., F.R.S. (Henry King and Co., London).

pressures between 30° S. and 46° S., with opposite wind-systems, the whole travelling from westward to eastward.

Lastly, it is believed that a careful study of the changes that took place from day to day will afford some insight into the operation of the laws by which they were governed, and which no doubt still govern similar changes.

10. The estimated cost of 500 copies of the entire work is 2,500*l.*, exclusive of the salaries of assistants.

11. The Meteorological Society, however desirous to see the realisation of an object for which it has been working since 1851, is unable to pay that sum. Its funds have been, and are still being, expended in collecting, tabulating, and correlating the materials, and in publishing, from time to time, observations and results of immediate interest, especially papers on hurricanes.

12. Considering, however, that the work on which it has been so long engaged would probably contribute in some measure to the material advantage, not only of the small Island of Mauritius, but of the great maritime nations whose ships traverse the Indian Ocean, the Society throughout has not been without the hope, that if, when the proper time came, assistance should be required, an appeal to Governments, institutions, and private persons interested in Navigation and Oceanic Meteorology, would not be made in vain.

13. Hitherto, the Society's expectations have been more than realised. In the first place, some merchants and other residents of Mauritius, headed by the Honourable Mr. Stein who was then President of the Society, contributed a sum of 156*l.* Subsequently another president, Mr. Charles Bruce, brought the matter to the notice of our late Governor his Excellency Sir Arthur Purves Phayre, who was pleased to recommend that a grant of Rs. 5,000, out of certain funds available for such purposes, should be made to the Society for assisting it to carry on the work, and this liberal donation was unanimously voted by the Council of Government.

14. In all, then, Mauritius has already contributed about 572*l.*

15. The object now is to obtain, by means of subscriptions in other countries, as well as in Mauritius, the rest of the money required for completing the work.

16. The prices of the several publications will depend upon the number of subscribers. It is hoped that the price of a monthly set of Synoptic Charts shall not exceed 10s., that of a chart of monthly averages 3s., and that of a copy of the Storm Atlas 40s.

17. If the total number of copies of the whole work, or of any portion of it, that may be subscribed for, exceed 400, the prices will be proportionally reduced.

18. Any funds that may be left over, after paying all expenses, will be used in preparing and publishing Synoptic Weather Charts for some other year, as 1867 or 1878, which were years remarkable for a comparative absence of hurricanes in the Indian Ocean.

19. Of the Synoptic Charts for February 1861, 250 copies still remain.

C. MELDRUM.

Royal Alfred Observatory,
Mauritius, April 16, 1881

The Chairman was requested to prepare a draft reply to the Colonial Office.

Mr. Scott stated that on the 31st ultimo he had applied to the War Office for the loan of a balloon (Minutes, p. 3), and submitted the following letters :—

M.O. 1184.

SIR, War Office, June 23, 1881.

IN reply to your letter dated 31st ultimo on the subject of the balloon "Saladin," I am directed by the Secretary of State for War to acquaint you that there will be no objection to the issue of the balloon "Saladin" to the Meteorological Department on loan, provided an undertaking is given by that Department to return it in as good order as it was in when issued.

I have, &c.
(Signed) J. H. SMITH,
For I. G. F.

The Secretary, Meteorological Department,
116, Victoria Street, S.W.

On receipt of the above letter he had communicated with Captain Templer, and he submitted the following letter from that officer :—

M.O. 1214. 44, Queen's Gardens, Hyde Park, W.,

DEAR SIR, Tuesday, June 28, 1881.

IN answer to your letter of last week, I shall be most happy to undertake your proposed experiments with free and captive balloons, at the same rate that I have been receiving from the Government during the past three years. I think you will find that the cost of the experiments will be as follows :—

		£	s.	d.
Captive only	For charging "Saladin" for captive work at Aldershot	7	0	0
	For labour, per day	2	0	0
	Replenishing gas, per day	1	0	0
Free only	For free ascents :—			
	"Saladin," to 20,000 alt.	9	0	0
	"Crusader," to 11,000 alt.	5	0	0
	"Saracen," to 5,000 alt.	3	0	0
Conveyance from Woolwich to Aldershot and back :—				
Waggons, ropes, and balloons and screens, say		10	0	0

This would bring the cost of the experiments for one month at Aldershot at something like the following:—

	£	s.	d.
Cost of gas, "Saladin"	35	0	0
Labour	60	0	0
Conveyance of gear to and back	10	0	0
Aëronaut's own time, at 21s. a day, 30 days	31	10	0
Fuel, light, lodging, and horse allowance	10	10	0
Total cost per month for captive work	£147	0	0

The free work would come in at 3*l*., 5*l*., and 9*l*., according to altitude, say, eight ascents, 30*l*. If the weather is good, I shall be able to keep going; if the weather is unfavourable, of course a large portion of the expenses are reduced.

I have, &c.
(Signed) JAMES TEMPLER,
Capt. R.E.R.M.

R. H. Scott, Esq.,
116, Victoria Street.

Mr. Scott was instructed to express to the War Office the thanks of the Council for the loan of the balloon, and to arrange with Captain Templer for a certain number of free ascents, to be made as far as possible under different conditions of weather.

The form for recording observations during the ascents, adopted (Minutes, 1880, p. 2), to be sent to the members of Council for reconsideration.

Read—The following Memorandum:—

Learning from Mr. Scott that the Council have decided to publish the January and July Cape Gale data in full, but not that for other months, I beg to propose the following method for completing the work:—

(*a*.) To get out the number of gales of each type for the remaining eight months, it having already been done for April and October. This will occupy Mr. Allingham about six weeks.

(*b*.) To represent each type of gale on monthly diagrams similar to those in Plates I. and III. for January, only on a smaller scale, so as to get the five types of gales for each month on one Plate. This is the simplest form of diagram, giving merely one arrow for each gale, and the whole will only occupy one person about four days. By means of these diagrams the navigator will see at a glance the geographical position in which he is likely to meet with a certain kind of gale in each month.

With the above-named date a table can be given showing the percentages of the different kinds of gales for each month, and the completely worked-up data of January and July can be referred to as showing specimens of those gales.

HENRY TOYNBEE,
Marine Superintendent.

21st June, 1881.

The Secretary was instructed to request Captain Toynbee to submit a specimen of the actual charts he proposes to give.

The draft of the Quarterly Weather Report, Part I., 1876 (Minutes, 1880, p. 41), was submitted and ordered for press, when approved by the Chairman.

The Secretary reported that he had received on the 21st instant a letter (No. 1150), from Mr. Buchan giving an account of the progress of the station at Ben Nevis. Telegraphic reports from Mr. Wragge had been received since the 17th instant, except on Sundays. He was instructed to make arrangements to have the messages received at Fort William on Sundays between 4 and 5 p.m., so as to reach Oban or Inverness between the same hours, at which time those offices are open during the summer months.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 5 logs had been received, all of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Barron	S.S. "Sultan"	Jan. 26—June 20, 1881.	Between Hull and Hamburg.	1880, p. 117.
Capt. T. W. Freeman	S.S. "Bellerophon."	Jan. 18—June 23, 1881.	London to Japan and home.	1880, p. 96.
Capt. S. Griff-Jones	Barque "Hermine"	Aug. 8, 1880—June 15, 1881.	Liverpool, Talcahuano, Iquique, and home.	1880, p. 40.
Capt. G. Shearer	Barque "Corona"	July 9, 1880—May 30, 1881.	Adelaide, San Francisco, and home.	1880, p. 16.
Capt. W. Waring	S.S. "Gordon Castle."	Dec. 8, 1880—June 16, 1881.	China, Japan, and home	1880, p. 82.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

SUBMITTED—The following STATEMENT respecting the RECORDS for January 1881, received from the SELF-RECORDING OBSERVATORIES (see Minutes 21st December 1868 and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :—														
Action - - - - - -	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Indifferent.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.
Records deficient, due to stoppage of clock -	0	0	4 hrs.	5 hrs.	0	0	0	0	0	0	0	0	0	0
„ „ other causes - -	0	0	0	0	*81 hrs.	†95 hrs.	0	0	0	0	†81 hrs.	‡2 hrs.	§8 hrs.	0
Orientation verified - - - -	29th	—	31st	—	22nd	—	31st	—	4th	—	15th	—	4th	—
No. of errors discovered by subsidiaries -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences -	0	0	7	4	1	1	2	0	3	29	0	3	0	6
Result of 40 *Remeasurements* :—														
Greatest difference - - - -	1·0	1·0	0·0	2·0	1·0	1·0	0·0	1·0	0·0	1·0	1·0	1·0	0·0	2·0
Mean difference irrespective of sign - -	0·0	0·3	0·0	0·4	0·0	0·7	0·0	0·4	0·0	0·4	0·0	0·4	0·0	0·5
Residual difference (—Meteorological Office) -	0·0	—0·2	0·0	0·0	0·0	0·0	0·0	+0·1	0·0	0·0	0·0	0·0	0·0	+0·1
RAIN GAUGE :—														
Action - - - - - -	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock -	70 hrs.		0		0		0		‖		0		0	
„ „ other causes - -	0		0		0		0		1 hr.		2 hrs.		0	
Errors in tabulation - - - -	0		1		0		0		1		0		0	

BAROGRAPH :—													
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Indifferent.		Do.		Do.		Do.		Do.	
Records deficient, due to stoppage of clock	0		0		0		0		0		0		0	
,, ,, failure of light	0		0		0		11 hrs.		2 hrs.		19 hrs.		2 hrs.	
,, ,, other causes	¶2 hrs.		**1 hr.		††3 hrs.		0		0		‡‡ 1 hr.		††1 hr.	
No. of errors discovered—														
In entry of standard	0		2		0		13		1		2		0	
,, calculating residual correction	0		2		1		1		4		1		0	
,, applying residual correction	1		2		1		52		0		2		3	
,, subtraction in subsidiary tables	0		0		1		0		1		1		1	
,, tabulation by subsidiaries	0		0		0		0		0		0		0	
,, ,, irregular differences	0		2		4		0		2		1		2	
Result of 40 *Remeasurements :—*														
Greatest difference	·005		·007		·010		·005		·005		·005		·006	
Mean difference irrespective of sign	·0022		·0022		·0027		·0021		·0026		·0023		·0021	
Residual difference (—Meteorological Office)	—·0005		+·0004		—·0007		—·0005		+·0001		+·0010		—·0004	
Mean monthly difference between simultaneous barograph and barometer readings	·0020		·0026		·0012		0019		·0016		·0015		·0015	
THERMOGRAPH :—														
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Do.		Indifferent.		Do.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, failure of light	0	3 hrs.	0	0	0	0	0	0	2 hrs.	2 hrs.	1 hr.	2 hrs.	2 hrs.	15 hrs.
,, ,, imperfectly moistened bulbs	—	0	—	2 hrs.	—	0	—	2 hrs.	—	7 hrs.	—	22 hrs.	—	1 hr.
,, ,, partially frozen bulbs	—	32 hrs.	—	7 hrs.	—	67 hrs.	—	7 hrs.	—	27 hrs.	—	9 hrs.	—	30 hrs.
,, ,, other causes	§§12 hrs.	§§12 hrs.	0	0	0	0	††10 hrs.	††6 hrs.	§§12 hrs.	‖‖1 hr.	0	0	0	‡‡ 3 hrs.
No. of errors discovered in entry of standard	0	0	3 hrs.	1	3	2	7	8	0	1	0	0	0	1
,, ,, by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, of subtraction in do. tables	0	0	0	0	0	0	1	3	1	5	0	0	0	0
,, ,, detected under glass scale	0	0	1	2	0	1	4	4	3	10	3	2	0	1
Result of 40 *Remeasurements :—*														
Greatest difference	0·2	0·2	0·2	0·3	0·2	0·3	0·3	0·3	0·3	0·5	0·2	0·2	0·2	0·3
Mean difference irrespective of sign	0·10	0·08	0·08	0·11	0·08	0·10	0·13	0·09	0·08	0·14	0·06	0·10	0·10	0·09
Residual difference (—Meteorological Office)	—0·08	+0·02	+0·05	+0·02	—0·03	—0·07	—0·12	+0·03	—0·01	—0·09	+0·01	—0·05	+0·09	—0·04
Mean monthly difference between simultaneous thermograph and thermometer readings	0·15	0·18	0·18	0·19	0·08	0·08	0·18	0·21	0·08	0·10	0·13	0·13	0·16	0·14
No. of errors in maxima and minima	0	—	3	—	1	—	7	—	8	—	2	—	2	—

* Injury to blade of fan. † Frost. ‡ Oiling instrument. § Imperfect action of pencils. ‖ Times of stopping uncertain. ¶ Curve blemished, 1 hour; changing curve, 1 hour.
** Cylinder moved too far. †† Photographic imperfections. ‡‡ Light out of position. §§ Out of focus. ‖‖ Changing threads.

Reported—That the Hay Harvest Forecasts had been commenced; the following was the list of recipients :—

Districts.	Name and Address of Recipients.
0. Scotland, North	Rev. Dr. Joass, Golspie. J. R. Mitchell, Esq., Drynie, Inverness.
1. Scotland, East	W. S. MacDonald, Esq., Craigielaw, Longniddry. G. Johnstone, The Castle, Glammis, by Forfar. John Annand, Esq., Inverurie.
2. England, N.E.	J. Turner, Esq., The Grange, Ulceby. J. Wilson, Esq., Woodhorn Manor, Morpeth.
3. England, East	J. B. Lawes, Esq., F.R.S., Rothamsted, St. Albans. W. Birkbeck, Esq., Thorpe, Norwich.
4. Midland Counties	Professor Ohm, Royal Agricultural College, Cirencester. The Duke of Somerset, Bulstrode, Bucks.
5. England, South	C. Whitehead, Esq., Barming House, Maidstone. E. P. Squarey, Esq., The Moot, Downton, Wilts.
6. Scotland, West	C. H. H. Wilsone, of Dalnair, Endrick Bank, Drymen. J. Chisholm, Esq., Chapel Rossan, Stranraer. J. S. R. Ballingal, Esq., Eallabus House, Islay.
7. England, N.W.	G. W. Wray, Esq., Leyburn, Yorkshire. The Earl of Derby, Knowsley, Prescot.
8. England, S.W.	R. Neville, Esq., Butleigh Court, Glastonbury. The Earl of Ducie, Spring Park, Gloucestershire. J. Dyke, Esq., Long Ashton, Clifton, Bristol. Col. Turbervill, Ewenny Priory, Bridgend.
9. Ireland, North	C. C. Hamilton, Esq., Cherrymount, Moynalty, Co. Meath. G. Simson, Esq., Kilrush, Hollymount, Co. Mayo. W. M. Kirk, Esq., The Bush, Antrim.
10. Ireland, South	D. A. M'Cready, Esq., Loughton, Moneygall. W. T. Crosbie, Esq., Ardfert Abbey, Tralee. D. Milward, Esq., Tullogher, New Ross.

Submitted—The following report :—

Sir, Meteorological Office, June 30, 1881.

I have the honour to report, for the information of the Council, on the work which has been done for the quarter ending 30th June 1881.

I discharged the duties of Marine Superintendent until the 10th May, on which date Captain Toynbee returned to the Office (vide Minutes, 12th May 1881).

Indian Ocean.—The sea-surface temperature charts for the months of February and May have been completed. I had the honour to submit them to the Council on the 12th May. The chart for the month of November will be finished in the course of the next month.

Atlantic Ocean.—The sea-surface temperature charts are in progress.

I have, &c.,

To Captain H. Toynbee, F.R.A.S., (Signed) C. W. Baillie.
Marine Superintendent.

Statement of Work done in the Pantagraph Room during June 1881.

June 30, 1881.

Copper Plates pantagraphed :—10 plates, Nos. 55 to 59, 1876; Nos. 62 to 66, 1880.

Zinc Plates :—Barograms, 10 plates, Nos. 61 to 64, 1876; Nos. 68 to 73, 1880; Thermograms, 11 plates, Nos. 61 to 64, 1876; Nos. 67 to 73, 1880; Vapour Tension, 8 plates, Nos. 55 to 60, 1876; Nos. 67 and 68, 1880; Anemograms, 13 plates, Nos. 55 to 61, 1876; Nos. 68 to 73, 1880; Rain Curves, 12 plates, Nos. 55 to 60, 1876; Nos. 68 to 73, 1880.

Barograms are ruled ready for pantagraphing to Plate 67, 1876; there are no thermograms prepared in advance of the zinc plates.

The mechanical reduction by the harmonic analyser of the Falmouth and Stonyhurst temperature curves for 1871 has been completed by Mr. Burton.

Some daily weather charts have been cut upon zinc plates by the pantographs to test the feasibility of their production in that way.

R. H. Curtis.

R. H. Scott, Esq., F.R.S.

Sir, Examination Room, June 30, 1881.

The following curves and tabulations have been examined since 31st May :—

January.—*Barograms*, one station; *Anemograms*, five stations.

February.—*Thermograms*, four stations; *Anemograms*, six stations.

The notes of errors for the *January* work and monthly report thereon, have been written out, and the curves and documents due during the month sorted and stamped; in addition, the data required by the Registrar-General of Ireland from Valencia and Armagh have been examined for the months of *April* and *May*.

I am, &c.

To R. H. Scott, Esq., Secretary. (Signed) T. E. Allen.

Submitted — An application for a fishery barometer for Durgan, Cornwall (Letter 1117).—Granted.

The Secretary reported that proofs of the entire series of the charts for the Cape Squares had been received from the lithographers, and revised by Captain Toynbee.

Resolved—That the sum of 50*l.* be paid to Captain Toynbee for the revision of these charts in accordance with the resolution of Council of October 29, 1880 (Minutes, 1880, p. 54).

Reported—I. That in consequence of the resignation of Mr. H. Green, mentioned at last meeting, the salaries of Mr. A. Green and Mr. A. H. Bell had each been raised 2*s.* per week on the 6-hours scale, and Mr. A. Green had been transferred to the Marine Room, at his own request, to fill his brother's vacancy.

II. That Mr. F. E. Allum had been appointed to fill Mr. A. Green's place, at a salary of 18*s.* per week on the 8-hours scale.

III. That Mr. Bevan, Civil Service writer, had resigned his engagement at the Office for the 2nd proximo.

The following cheques for June were drawn this day:—

	£	s.	d.	£	s.	d.
Administration:						
R. H. Scott, salary	-		-	66	13	4
J. S. Harding, jun. } Salaries and wages	27	15	6			
T. D. Bell }	13	6	8			
J. S. Harding, sen. }	*8	19	8			
				50	1	10
C. W. Jacques, rent, No. 116	133	13	0			
„ „ No. 113	18	0	6			
				151	13	6
H. Bond and Son, furniture, fittings, &c.	22	6	0			
„ „	10	14	0			
				33	0	0
E. Higgs, cleaning windows, &c.	-		-	3	11	6
Pickford & Co., carriage of parcels	-		-	1	9	4
Williams and Norgate, books	-		-	3	1	6
Special Researches:						
C. E. Burton, salary†	-		-	4	4	0
E. I. Strachan, Arctic work	-		-	3	0	0
W. Thomas, care of anemometer at Scilly	-		-	1	13	7
H. Williams, care of anemometer at Holyhead	-		-	2	10	0
Land Meteorology (Quarterly Allowances, &c.):						
C. Niven, Aberdeen	-		-	68	17	4
T. R. Robinson, Armagh	46	19	0			
„ „ (expenses)	10	7	9			
				57	6	9
W. L. Fox, Falmouth	-		-	72	6	2
R. Grant, Glasgow	-		-	68	8	4
H. Williams, Holyhead	-		-	2	13	5
G. M. Whipple, Kew	100	0	0			
„ „ waxed paper	10	0	0			
				110	0	0
C. Clouston, Orkney	-		-	3	13	7
G. H. Aird, Seaham	-		-	2	13	9
S. J. Perry, Stonyhurst	-		-	55	18	4
J. E. Cullum, Valencia	16	13	4			
„ „ (expenses)	48	14	2			
				65	7	6
G. T. Watson, Yarmouth	-		-	3	19	6
J. O'Driscoll, rent at Valencia	-		-	25	0	6
Carried forward	-		-	£857	3	9

* Four weeks ending 25th June. † Two weeks ending 25th June.

	£ s. d.	£ s. d.
Brought forward -	- -	857 3 9
Land Meteorology (Quarterly Allowances, &c.)—*cont.*		
W. Marriott, Meteorological Society's Returns	- -	27 10 0
R. W. Munro, Anemometer cups - -	- -	9 10 0
R. H. Curtis -	22 4 5	
J. A. Curtis -	15 11 1	
T. E. Allen - Discussion, &c. of observations	15 11 1	
C. H. Thompson	*9 4 0	
E. G. Aldridge -	*7 6 8	
		69 17 3
Weather Information (Quarterly Allowances, &c.) :		
J. W. Mayes, Ardrossan - - -	- -	1 3 6
Postmaster, Bundoran - - -	- -	1 8 0
H. Todd, Cambridge - - - -	- -	4 11 0
Postmaster, Cliffony - - - -	- -	1 1 0
H. Mohn, Christiania - - - -	- -	5 10 0
Postmaster, Donaghadee - - -	- -	0 14 0
J. Costello, Dover - - - -	- -	3 18 6
W. Brand, Dunrossness - - -	- -	1 13 7
Postmaster, Enniskillen - - -	- -	1 1 0
G. Wooding, Hawes Junction - - -	- -	3 18 2
J. Tilston, Holyhead - - - -	- -	3 18 0
G. G. Appleton, Hurst Castle - - -	- -	3 18 4
Postmaster, Inverness - - - -	- -	1 6 0
J. Fisher, Jersey - - - -	- -	4 5 6
Postmaster, Killarney - - - -	- -	1 1 0
J. Hutchison, Leith - - - -	- -	0 13 0
F. Gaster, London - - - -	- -	3 18 0
K. Kerr, Mullaghmore - - -	3 19 1	
W. Conway „ - - - -	5 17 7	
		9 16 8
W. D. Penny, Nairn - - - -	- -	4 4 6
Postmistress, „ - - - -	- -	0 13 0
E. J. Lowe, Notts - - - -	- -	3 18 0
H. E. C. Bellamy, Oxford - - -	- -	3 12 6
G. Phillips, Parsonstown - - -	- -	4 10 4
J. John, Prawle Point - - - -	- -	3 5 0
G. Baker, St. Ann's Head - - -	- -	4 1 1
W. Thomas, Scilly - - - -	- -	4 18 1
R. W. Scaddard, Scilly - - - -	- -	0 14 0
J. Sibert, Spurn - - - -	- -	3 5 5
Postmaster, Valencia - - - -	- -	0 14 0
J. Sinclair, Wick - - - -	- -	3 5 0
J. Murray „ - - - -	- -	1 6 0
G. T. Watson, Yarmouth - - -	- -	4 12 0
A. Guy, York - - - - -	- -	3 18 0
Postmaster General, telegrams - - -	- -	151 11 1
F. Gaster -	30 7 6	
W. L. Dallas - Preparation, &c. of Weather	19 15 1	
F. Brodie - Reports.	18 1 1	
H. W. Chivers -	*6 12 0	
		74 15 8
Inspections :		
A. Buchan, salary - - - -	- -	37 10 0
W. C. Ley, salary - - - -	- -	37 10 0
Carried forward	- -	£1,365 19 11

* Four weeks ending 25th June.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	1,365	19	11
Ocean Meteorology:						
Captain H. Toynbee - -	33	6	8			
R. Strachan - - -	27	15	6			
C. Harding - - -	22	4	5			
H. Harries - - -	11	4	0			
Nav. Lieut. C. W. Baillie, R.N. -	16	13	4			
Discussion, &c. of observations, and care of instruments.				111	3	11
P. Adie, repairing "A" Barometers - -	9	6	6			
" " "BT" " - -	47	8	6			
				56	15	0
Miscellaneous:						
P. Adie, commissions - - - -	-		-	10	2	6
W. Allingham " - - - -	-		-	6	7	5
J. S. Harding, jun., petty cash - -	120	0	0			
" " - -	80	0	0			
				200	0	0
				£1,750	8	9

116, *Victoria Street, July* 11, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (June 30) were read and confirmed.

The following reply (Letter 1374) to the letter from the Colonial Office (Minutes, p. 32) was adopted, and the Secretary was instructed to forward it:—

M.O. 1154.

SIR, July 12, 1881.

IN reply to your letter of the 21st ultimo, enclosing a copy of Dr. Meldrum's synoptic weather charts of the Indian Ocean for the month of February 1861, I am instructed to state that the Meteorological Council, while fully recognising the great scientific value of synoptic charts, such as have been proposed by Dr. Meldrum, are not prepared, on account of the expense it would involve, to recommend that the form and scale of the charts already published for February 1861 should be adopted for a complete series of daily synoptic charts of the Indian Ocean.

Charts giving the isobaric lines and the generalised wind direction and force for every day in a year would, in the opinion of the Meteorological Council, supply the information that would be essential, and might be drawn on a much smaller scale, and published at a much smaller cost.

The Council would accordingly suggest that the plan proposed should be modified to this extent.

I am, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

The Under Secretary of State
for the Colonies.

Read—The following letter (Minutes, p. 14):—

United States of America, War Department,
Office of the Chief Signal Officer, Washington, D.C.,
June 24, 1881.

M.O. 1292.

SIR,

I AM in receipt of yours (without date), stating that the Council of the Meteorological Office will forward to this Office, semi-monthly, copies of all schedules of simultaneous observations received up to date, but that they cannot be made out in duplicate by the observers and sent direct by them to this Office.

I thank you for your interest in my attempt to perfect the daily weather map of the Northern Hemisphere, and beg you to convey to the Council my high appreciation of their valued co-operation.

I am, &c.
(Signed) W. B. HAZEN,
Brig. and Bvt. Maj.-Gen.,
Chief Signal Officer, U.S.A.

Mr. R. H. Scott,
Secretary of the Meteorological Council,
116, Victoria Street, London, S.W., England.

The Secretary reported that he had received from the Chief Signal Office copies of the instructions governing the establishment and management of the Polar Expeditions to Lady Franklin Bay and Point Barrow (Letter 1295; Minutes, p. 14).

The form for recording observations in balloon ascents (Minutes, 1880, p. 2) was considered, and ordered to be reprinted, as amended, and laid before the Council at their next meeting.

Mr. De La Rue submitted the following memorandum:—

ELECTRICAL observations in balloons might be made by means of a modification of Thomson's electrometer, the needle of which would be connected with an insulated Thomson's jet-discharging cistern.

A battery of 100 chloride of silver cells would have to be used to charge the opposite pairs of quadrants by connecting one pole to one pair, the other pole to the other pair.

The centre of the battery would have to be connected with a trail-wire, furnished with a number of points, which might be lowered from 10 feet to 3,000 feet according to the relative electric conditions of two layers; better still, the centre of the battery might be connected with a second Thomson's cistern, the discharge from which would pass through a strong vulcanised tube furnished with a jet.

The subject was referred to Professor Stokes and Mr. De La Rue, who were requested to report upon it at the next meeting.

It was agreed that no ascents should be undertaken till after the next meeting of the Council.

Read—The following letter:—

M.O. 1237.

DEAR MR. SCOTT, 62, Camden Square, London, N.W., July 1, 1881.

I HAVE much pleasure in sending herewith, in accordance with the agreement of April 23rd, 1880, the whole of the returns which I undertook to supply, together with a list upon which is stated the reason for the absence of those which have proved to be defective—35 in number, leaving 336 perfect records out of the original list.

Being extremely desirous that the work should be as nearly perfect as possible, I have added *all* the other records which have proved available, and they reach the large number of 31, thus almost exactly replacing the absentees and giving the very large total of 367 perfect synchronous records for 15 consecutive years.

Yours, &c.

R. H. Scott, Esq., M.A., F.R.S., Sec. Met. Council. (Signed) G. J. SYMONS.

The form in which the returns should be published was considered, and it was resolved—

I. That the means for the whole 15 years should be inserted.

II. That the stations should bear a current number, and should be arranged according to counties, their order in each county being alphabetical, and the order of the counties being that employed in Mr. Symons's "British Rainfall."

III. That the returns should be accompanied by—

(*a.*) An alphabetical index of the stations;

(*b.*) An index of the counties and of the stations severally contained in them;

(*c.*) A chart of the stations, showing the river basins;

(*d.*) An abstract of the mean annual rainfall of each station, arranged according to counties, the counties as well as the stations being in alphabetical order.

The Secretary was instructed to have specimens of the returns set up in type to be submitted to the Council at next meeting.

Read—A memorandum from Captain Toynbee reporting that since the last meeting six logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. Moses Parry -	Barque "Queen of Cambria"	Sept. 2, 1880—July 1, 1881.	Australia and home -	1880, p. 54.
Capt. C. W. Pearson	S.S. "Strathleven."	Feb. 19—June 24, 1881.	Cape Town, Natal, Rangoon, and home.	1880, p. 122.
Capt. W. Warden -	S.S. "Elizabeth Martin."	March 1—June 18, 1881.	Cape Town and home -	1880, p. 128.
Capt. H. P. Wight	Ship "Oamaru"	Dec. 1, 1880—June 26, 1881.	New Zealand and home -	1880, p. 40.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted—The following report on the forecasts for April 1881 (Minutes, p. 31):—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

2.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	36	48	42	70
,,	b	32	24	28	
,,	c	20	16	18	
,,	d	12	12	12	
Scotland, E.	a	16	40	28	72
,,	b	52	36	44	
,,	c	24	24	24	
,,	d	8	—	4	
England, N.E.	a	32	40	36	78
,,	b	56	28	42	
,,	c	4	28	16	
,,	d	8	4	6	
England, E.	a	28	36	32	82
,,	b	48	52	50	
,,	c	16	4	10	
,,	d	8	8	8	
Midland Cos.	a	40	40	40	70
,,	b	28	32	30	
,,	c	28	20	24	
,,	d	4	8	6	
England, S.	a	24	32	28	64
,,	b	52	20	36	
,,	c	16	36	26	
,,	d	8	12	10	
Scotland, W	a	36	40	38	68
,,	b	24	36	30	
,,	c	36	20	28	
,,	d	4	4	4	
England, N.W.	a	32	40	36	84
,,	b	56	40	48	
,,	c	8	20	14	
,,	d	4	—	2	
England, S.W.	a	44	48	46	90
,,	b	48	40	44	
,,	c	—	12	6	
,,	d	8	—	4	
Ireland, N.	a	40	48	44	78
,,	b	44	24	34	
,,	c	16	20	18	
,,	d	—	8	4	
Ireland, S.	a	36	44	40	80
,,	b	40	40	40	
,,	c	24	12	18	
,,	d	—	4	2	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	30	37	34	82
,,	b	60	37	48	
,,	c	7	13	10	
,,	d	3	13	8	
Scotland, E.	a	23	50	37	77
,,	b	60	20	40	
,,	c	7	27	17	
,,	d	10	3	6	
England, N.E.	a	23	40	32	71
,,	b	54	24	39	
,,	c	10	33	21	
,,	d	13	3	8	
England, E.	a	30	46	38	77
,,	b	53	24	39	
,,	c	7	27	17	
,,	d	10	3	6	
Midland Cos.	a	23	40	32	79
,,	b	54	40	47	
,,	c	16	13	14	
,,	d	7	7	7	
England, S.	a	43	37	40	85
,,	b	43	47	45	
,,	c	11	16	14	
,,	d	3	—	1	
Scotland, W.	a	27	40	34	62
,,	b	30	27	28	
,,	c	30	30	30	
,,	d	13	3	8	
England, N.W.	a	27	37	32	76
,,	b	44	43	44	
,,	c	13	13	13	
,,	d	16	7	11	
England, S.W.	a	37	33	35	79
,,	b	50	37	44	
,,	c	10	30	20	
,,	d	3	—	1	
Ireland, N.	a	40	40	40	80
,,	b	40	40	40	
,,	c	17	13	15	
,,	d	3	7	5	
Ireland, S.	a	34	43	39	75
,,	b	46	27	36	
,,	c	13	23	18	
,,	d	7	7	7	

Summary.

British Isles	a	33	41	37	76
,,	b	44	34	39	
,,	c	17	19	18	
,,	d	6	6	6	
British Isles	a	31	40	36	76
,,	b	48	33	40	
,,	c	13	22	18	
,,	d	8	5	6	

Submitted—The following—

Statement of Work done in Marine Room during June 1881.

July 9, 1881.

Examined 17 new logs, and 5 lighthouse registers.

Cape of Good Hope District.

Wind Charts.—Proofs of large charts received, for April to October inclusive.
Current Charts.—Notes for charts prepared.

Proofs for large charts received for November and December.
Examination of first proof completed for all months.
Carrying out alterations and addition to charts.
Cape Gales.—Plates IV. and V. prepared for January.

Percentage of wind-frequency for January, April, July, and October worked, and all months prepared for printer.
Correcting copies of letterpress of January Cape Gales for Council.
Work for Annual Report—woodcuts, notes, &c.
Comparison of weighted and unweighted wind observations for various areas in the Cape District.
Worked unweighted wind observations for the three months, January to March for the space { 34°–36° S. / 20°–25° E. }
Proofs of plates illustrating Cape Charts for Annual Report received and compared.
Obtaining estimate of number of gales and ships observing, to be dealt with for 12 months in connection with Cape Gale work, also estimate of time necessary for doing the work.
Obtaining number of days contained in Cape Gale logs for January, April, July, and October.

General.

Making copies of meteorological examination papers for training ships.
Posting index of data in ocean 10° squares.
Instructing new clerk in work of room.
Mr. James assisting Lieutenant Baillie on sea temperature work throughout the month.

(Signed) CHAS. HARDING.
HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq.

Read—The following letter (Minutes, p. 23) :—

M.O. 1271.

SIR, 28, Spring Gardens, S.W., July 7, 1880.

WITH reference to your letter of the 6th instant, requesting that the observations of air and sea temperature made at certain coastguard stations may be continued after the 30th September next, I have to request that you will be so good as to inform me for what further period it is desired that the observations shall be continued.

I am, &c.
(Signed) R. G. DOUGLAS,
For Admiral Superintendent.

Robt. H. Scott, Meteorological Office,
116, Victoria Street, S.W.

The Secretary was instructed to send the following reply—

M.O. 1271.

SIR, July 13, 1881.

WITH reference to Captain Douglas' letter of the 7th instant (No. 3838), I am instructed to state that the Meteorological Council request that the observations of air and sea temperature now taken at certain coastguard stations may be continued for one year from the 30th of September next.

The discussion of these observations is in progress, and as great interest attaches to them, it is not improbable that the Council may hereafter ask for a still further prolongation of the time, if the results arrived at should, in their opinion, justify such an application.

I have, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

His Royal Highness
The Admiral Superintendent of Naval Reserves.

Reported—That the Kew Committee had authorised Mr. Whipple to undertake the inspection of the observatories, as in previous years.

Reported—That Messrs. A. Woolston and A. Strahan had resigned their temporary clerkships in the Office, having obtained employment elsewhere.

116, *Victoria Street, July* 20, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (July 11) were read and confirmed.

The form for recording observations in balloons, as amended, was approved.

It was agreed: (1.) That the contemplated electrical observations be postponed till after the recess, the apparatus not being yet ready; (2.) That arrangements be made to enable the senior clerks to join in the ascents, if they should volunteer to do so; (3.) That Captain Templer be requested to attend at the Office in order to acquaint himself with the best modes of observing.

Mr. Scott was instructed to write to Captain Templer to the above effect (Letter 1445).

Mr. Galton mentioned that he had made inquiries of Captain A. Noble, C.B., F.R.S., on the possibility of forming a smoke cloud at a considerable altitude, for the observation of upper air currents, by firing a small shell, with a bursting charge, from a sea-side station, that the plan seemed to be feasible, but that preparative experiments were needful to determine the best method of forming a dense and durable smoke cloud.

Resolved—That Mr. Galton be authorised to expend, in conjunction with Captain Noble, a sum not exceeding 20*l.* in these experiments.

Read—Letter 1333 from the Scottish Meteorological Society, informing the Council that their memorial on the subject of the Ben Nevis Observatory (Minutes, pp. 28, 29) had been presented to the Treasury by their President, the Duke of Richmond and Gordon, K.G.

The form for publication of Mr. Symons's rain tables was considered. An 8vo. size was selected, and the Secretary was instructed to have the tables printed.

It was resolved that a further sum of 200*l.* be paid to Mr. Symons on account.

Reported—That the information asked for by Mr. Blanford, as to the methods employed by the Office in the discussion of marine meteorology (Minutes, p. 2), had been prepared and would be forwarded without delay (Letter 1519).

Submitted—From Captain Toynbee a specimen chart, showing the April gales experienced in the district near the Cape of Good Hope, classified according to the five types proposed by him (Minutes, p. 35).—Approved.

Mr. Scott stated that the communication with Mullaghmore (Minutes, 1878, p. 37), was now carried on by messenger to or from Cliffony, at a cost of 23*l.* 10*s.* 4*d.* annually, and that no means existed for obtaining special reports during the day.

Resolved—That in consideration of the importance of the reports from Mullaghmore, the Secretary be instructed to make arrangements with the Post Office for the erection of a private wire between Cliffony and Mullaghmore at the estimated annual cost of 35*l.* 5*s.* (Letter 1175).

Read—A memorandum from Captain Toynbee reporting that since the last meeting one log had been received, which was "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. R. H. Napier, log kept by Lieut. A. Balfour.	H.M.S. "Magpie."	Jan. 1—March 15, 1881.	Surveying in China Seas	1880, p. 128.

Mr. Scott was instructed to convey the best thanks of the Council to Captain Napier and Mr. Balfour.

The Secretary reported to the Council that in an appendix to the Annual Report the titles of the works added to the library in 1880 had been printed in the form now generally recommended for library catalogues; and that he had had a card

catalogue of the books received since January 1, 1880, prepared by the clerks in charge of the library. He was authorised to expend during the present financial year a sum not exceeding 20*l.* on the preparation of a card catalogue of books received before that date.

The Secretary stated that the discussion, by means of the Harmonic Analyser, of the dry bulb records of the seven observatories for 1871 had been completed by Mr. Burton, and he was instructed to have the discussion of the same records for 1872 taken in hand.

The Secretary reported that Mr. Burton had found the working of the instrument to be improved by the addition of weights intended to prevent the axles of the cylinders from canting. It was resolved that these should be put on in a permanent manner by Mr. Munro, if Professor Stokes should think the addition advisable.

Submitted—The following report on the forecasts for May 1881 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

3 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	23	47	35	82
„	b	47	47	47	
„	c	19	3	11	
„	d	11	3	7	
Scotland, E.	a	39	43	41	78
„	b	27	46	37	
„	c	15	4	9	
„	d	19	7	13	
England, N.E.	a	50	50	50	81
„	b	27	35	31	
„	c	19	15	17	
„	d	4	—	2	
England, E.	a	35	50	43	81
„	b	38	38	38	
„	c	27	8	17	
„	d	—	4	2	
Midland Cos.	a	43	43	43	85
„	b	38	46	42	
„	c	15	7	11	
„	d	4	4	4	
England, S.	a	43	62	53	83
„	b	38	23	30	
„	c	11	7	9	
„	d	8	8	8	
Scotland, W.	a	35	62	49	78
„	b	31	27	29	
„	c	23	11	17	
„	d	11	—	5	
England, N.W.	a	38	58	48	75
„	b	31	23	27	
„	c	27	11	19	
„	d	4	8	6	
England, S.W.	a	19	35	27	73
„	b	54	38	46	
„	c	23	19	21	
„	d	4	8	6	
Ireland, N.	a	31	43	37	70
„	b	38	27	33	
„	c	31	26	28	
„	d		4	2	
Ireland, S.	a	23	38	31	70
„	b	43	35	39	
„	c	26	15	20	
„	d	8	12	10	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	26	36	31	78
„	b	52	42	47	
„	c	13	19	16	
„	d	9	3	6	
Scotland, E.	a	39	62	51	80
„	b	29	29	29	
„	c	19	6	12	
„	d	13	3	8	
England, N.E.	a	45	52	49	88
„	b	42	36	39	
„	c	13	9	11	
„	d	—	3	1	
England, E.	a	42	33	38	86
„	b	39	58	48	
„	c	13	9	11	
„	d	6	—	3	
Midland Cos.	a	42	42	42	86
„	b	39	48	44	
„	c	13	10	11	
„	d	6	—	3	
England, S.	a	52	58	55	88
„	b	26	39	33	
„	c	13	3	8	
„	d	9	—	4	
Scotland, W.	a	36	39	38	75
„	b	26	48	37	
„	c	29	13	21	
„	d	9	—	4	
England, N.W.	a	42	58	50	81
„	b	36	26	31	
„	c	13	13	13	
„	d	9	3	6	
England, S.W.	a	36	36	36	81
„	b	42	48	45	
„	c	16	13	15	
„	d	6	3	4	
Ireland, N.	a	36	52	44	74
„	b	36	23	30	
„	c	19	16	17	
„	d	9	9	9	
Ireland, S.	a	26	45	36	74
„	b	42	33	38	
„	c	23	16	19	
„	d	9	6	7	

Summary.

British Isles	a	34	48	42	77
„	b	37	35	36	
„	c	22	12	16	
„	d	7	5	6	
British Isles	a	38	47	43	81
„	d	37	39	38	
„	c	17	11	14	
„	d	8	3	5	

Submitted—The following report on the forecasts for June 1881 (Minutes, p. 31) :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

3 P.M.

Districts.		Percentages. Wind.	Weather.	Averag Forecast.	Percentage of Success a + b.
Scotland, N.	a	31	38	35	83
„	b	50	46	48	
„	c	8	16	12	
„	d	11	—	5	
Scotland, E.	a	38	31	35	83
„	b	46	50	48	
„	c	8	11	9	
„	d	8	8	8	
England, N.E.	a	46	31	39	79
„	b	27	54	40	
„	c	19	7	13	
„	d	8	8	8	
England, E.	a	19	46	33	77
„	b	54	35	44	
„	c	23	8	16	
„	d	4	11	7	
Midland Cos.	a	27	38	33	69
„	b	38	35	36	
„	c	23	27	25	
„	d	12	—	6	
England, S.	a	23	35	29	76
„	b	50	43	47	
„	c	23	19	21	
„	d	4	3	3	
Scotland, W.	a	15	35	25	74
„	b	54	43	49	
„	c	19	19	19	
„	d	12	3	7	
England, N.W.	a	27	38	32	76
„	b	50	38	44	
„	c	19	16	18	
„	d	4	8	6	
England, S.W.	a	27	43	35	64
„	b	35	23	29	
„	c	27	31	29	
„	d	11	3	7	
Ireland, N.	a	23	43	33	75
„	b	50	34	42	
„	c	15	—	8	
„	d	12	23	17	
Ireland, S.	a	27	31	29	60
„	b	38	23	31	
„	c	23	31	27	
„	d	12	15	13	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	30	53	42	83
„	b	46	37	41	
„	c	16	7	12	
„	d	8	3	5	
Scotland, E.	a	30	30	30	85
„	b	57	53	55	
„	c	10	13	12	
„	d	3	4	3	
England, N.E.	a	40	37	39	79
„	b	40	40	40	
„	c	10	16	13	
„	d	10	7	8	
England, E.	a	27	30	29	82
„	b	60	46	53	
„	c	10	16	13	
„	d	3	8	5	
Midland Cos.	a	40	34	37	80
„	b	43	43	43	
„	c	13	16	15	
„	d	4	7	5	
England, S.	a	37	33	35	80
„	b	53	37	45	
„	c	7	27	17	
„	d	3	3	3	
Scotland, W.	a	34	40	37	77
„	b	43	37	40	
„	c	10	16	13	
„	d	13	7	10	
England, N.W.	a	33	30	32	74
„	b	40	44	42	
„	c	20	23	21	
„	d	7	3	5	
England, S.W.	a	20	27	24	64
„	b	50	30	40	
„	c	20	23	21	
„	d	10	20	15	
Ireland, N.	a	30	41	36	80
„	b	46	43	44	
„	c	10	—	5	
„	d	14	16	15	
Ireland, S.	a	20	37	29	77
„	b	57	40	48	
„	c	13	13	13	
„	d	10	10	10	

Summary.

British Isles	a	28	37	33	74
„	b	44	39	41	
„	c	19	17	18	
„	d	9	7	8	
British Isles	a	31	36	34	79
„	b	49	41	45	
„	c	12	15	13	
„	d	8	8	8	

Submitted—The following :—

Statement showing Progress made with the Charts for the Cape of Good Hope District.

Current Charts.—Twelve large charts sent to revise, with marginal notes attached.

Wind Charts.—Twelve large charts, proofs received; considerable progress made in checking proofs, also in compiling the marginal notes. Probably all will be returned to lithographer for revise in a fortnight.

Key Charts.—Proofs received of both Current and Wind Charts; both will be put forward after final handling of Wind Charts.

Ice, Specific Gravity, and Passage Chart will be proceeded with as opportunity offers.

I am of opinion that by the end of the month the Ice, &c. Chart will have gone to the lithographer, and that all other charts will have gone for revise.

Chas. Harding,
11th July 1881.
H. Toynbee.

SUBMITTED—The following STATEMENT respecting the RECORDS for February 1881, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action - - -	Indifferent.	Good.	Indifferent.	Indifferent.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, other causes -	0	0	0	0	0	*3 hrs.	0	0	†24 hrs.	†24 hrs.	0	*9 hrs.	0	0
Orientation verified - - - - -	26th	—	28th	—	19th	—	28th	—	28th	—	28th	—	19th	—
No. of errors discovered by subsidiaries -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
,, ,, irregular differences	0	0	0	2	1	1	1	3	1	1	1	2	0	1
Result of 40 *Remeasurements*:—														
Greatest difference - - - -	0·0	1·0	0·0	2·0	1·0	1·0	0·0	1·0	0·0	1·0	0·0	2·0	1·0	1·0
Mean difference irrespective of sign - -	0·0	0·4	0·0	0·5	0·0	0·5	0·0	0·5	0·0	0·4	0·0	0·6	0·0	0·5
Residual difference (— Meteorological Office) -	0·0	−0·1	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	+0·2	0·0	+0·1
RAIN GAUGE:—														
Action - - - - - -	Good		Good.		Indifferent.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock -	52 hrs.		0		0		0		0		0		0	
,, ,, other causes - -	‡49 hrs.		0		0		0		0		0		0	
Errors in tabulation - - - -	0		0		0		0		1		1		2	

BAROGRAPH :—							
Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Bad.	Do.	Do.	Do.	Do.	Indifferent.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
„ „ failure of light	0	1 hr.	0	0	0	0	0
„ „ other causes	0	§4 hrs.	0	0	¶1 hr.	0	0
No. of errors discovered—							
In entry of standard	0	0	0	2	1	2	0
„ calculating residual correction	0	0	0	0	3	0	1
„ applying residual correction	0	2	0	5	0	4	2
„ subtraction in subsidiary tables	0	1	0	1	1	0	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	1	2	3	2	1	0	1
Result of 40 *Remeasurements :—*							
Greatest difference	·005	·006	·007	·005	·005	·005	·005
Mean difference irrespective of sign	·0018	·0024	·0024	·0028	·0024	·0021	·0021
Residual difference (—Meteorological Office)	—·0006	+·0002	—·0004	+·0002	—·0004	—·0002	+·0009
Mean monthly difference between simultaneous Barograph and Barometer readings	·0020	·0027	·0012	·0015	·0019	·0017	·0019

THERMOGRAPH :—																
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Indifferent.		Do.		Do.		Do.		Do.		Do.		Do.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	1	1	0	0	0	0	0	0	3	2	0	0		
„ „ imperfectly moistened bulbs	—	18	—	0	—	4	—	3	—	15	—	13	—	0		
„ „ partially frozen bulbs	—	75	—	33	—	4	—	36	—	22	—	8	—	0		
„ „ other causes	0	0	0	0	0	0	0	§1	‖3	1	0	0	0	0		
No. of errors discovered in entry of Standard	0	0	0	14	0	0	0	0	1	0	0	0	0	0		
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
„ „ of subtraction in do. tables	0	0	0	1	2	0	1	3	3	4	0	1	2	0		
„ „ detected under glass scale	1	1	2	3	0	0	1	3	6	4	0	1	1	1		
Result of 40 *Remeasurements :—*																
Greatest difference	0·3	0·3	0·3	0·3	0·2	0·2	0·2	0·3	0·3	0·2	0·2	0·2	0·3	0·3		
Mean difference irrespective of sign	·09	·11	0·10	0·12	0·09	0·10	0·09	0·10	0·15	0·09	0·09	0·09	0·13	0·09		
Residual difference (—Meteorological Office)	—·08	+·10	+0·10	+0·09	—0·01	—0·05	—0·03	—0·05	—0·13	—0·08	—0·01	—0·04	+0·12	—0·04		
Mean monthly difference between simultaneous Thermograph and Thermometer readings	0·08	0·12	0·16	0·14	0·07	0·10	0·17	0·16	0·08	0·12	0·12	0·14	0·16	0·15		
No. of errors in maxima and minima	0	—	5	—	1	—	2	—	4	—	3	—	5	—		

* Frost. † Imperfect action of pencils. ‡ Cleaning clock. § Photographic imperfections. ¶ Finger-marked. ‖ Chimney wrongly fixed, 2 hours ; replacing gas-meter, 1 hour (see Wet).

Reported—That Dr. Russell (Letter 1321) had forwarded accounts for 5*l.* 16*s.* 3*d.* expended on preparations for fog experiments. The bill was ordered for payment.

Submitted—The following statement of accounts for the quarter ending 30th June 1881:—

Income.	£ s. d.	£ s. d.
Balance from year 1880–81		1,401 14 10
Proportion of vote for quarter		3,750 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	7 14 2	
(2.) Special researches	3 13 6	
(3.) Observatories and stations	10 0 0	
		21 7 8
Supply of Weather Information:		
D.W. charts and forecasts	66 3 11	
8h. 30m. p.m. charts	6 5 0	
Information for Press Agencies, &c.	23 10 2	
Telegrams	75 13 11	
		171 13 0
Supply of Ocean statistics		1 1 0
„ Miscellaneous data		2 18 6
Sale of Instruments, &c.:		
Mercantile Marine account		22 9 3
Commission charged on work done for Colonies, &c.		11 9 2
		£5,382 13 5

Expenditure.	£ s. d.	£ s. d.
Administration:		
Payment of Council	250 0 0	
Secretary	200 0 0	
Salaries and wages	177 11 11	
Rent, fuel, and lighting	153 17 6	
Furniture and fittings	47 19 10	
Incidental and contingent expenses	98 19 0	
		928 8 3
Special Researches:		
Mr. Burton's salary	29 8 0	
Rainfall observations	200 0 0	
Sundry charges	36 12 1	
		266 0 1
Land Meteorology:		
Observatories and stations	625 10 1	
Discussion and reduction of observations	370 12 7	
		996 2 8
Weather Information and Forecasts:		
Telegraphic reports and storm warnings	659 14 4	
Preparation and issue of reports and forecasts	367 12 11	
		1,027 7 3
Inspections:		
Salaries and travelling expenses		113 6 2
Ocean Meteorology:		
Discussion and reduction of observations	370 0 5	
Expenses incidental to the supply of instruments:		
Care and issue of instruments	50 0 0	
Royal Navy	94 14 3	
Mercantile Marine	63 9 7	
Distant island and coast stations	7 1 0	
		585 5 3
Balance		1,466 3 9
		£5,382 13 5

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council	250 0 0	By cash at Bank	1,960 12 0
„ Post Office (partly estimated)	308 17 5	„ „ at Office	179 1 4
„ sundry creditors	489 3 4	„ „ at Valencia	50 0 0
„ „ (contracts or work uncompleted)	530 14 0	„ H.M. Exchequer	250 0 0
„ balance	1,466 3 9	„ sundry debtors	605 5 2
	£3,044 18 6		£3,044 18 6

116, *Victoria Street, October* 28, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. GALTON.	LIEUT.-GENERAL STRACHEY.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (July 20) were read and confirmed.

Read—The following letter (*vide* Minutes of Meteorological Committee, 1870, p. 14) :—

M.O. 1476.

MONSIEUR, Paris, le 9 Août 1881.

DEPUIS plusieurs années, le service d'avis de tempêtes organisé d'après vos indications, fonctionne, à la grande satisfaction de nos marins, sur les côtes de France, de Dunkerque à Rochefort ; et les signaux sont, comme vous le savez, arborés en exécution des avertissements donnés par le Meteorological Office de Londres.

M. le Directeur du Bureau Central Météorologique de France vient de me faire connaître qu'à la suite de l'expérience acquise maintenant, et grâce aux relations télégraphiques régulières qu'il entretient avec l'office Britannique, il pense être en mesure de fournir directement les prévisions en question à nos ports.

En conséquence, et conformément à la demande de M. Mascart, j'ai l'honneur de vous informer que le Bureau Central Météorologique de France se chargera désormais de la transmission à nos ports des *Avis de mauvais temps ;* et que, d'après l'accord établi avec M. le Ministre des Postes et des Télégraphes, ce nouveau service fonctionnera à dater du 1er Septembre prochain.

En vous donnant avis de ces dispositions, et au moment où le Meteorological Office de Londres va cesser l'envoi de ses avis de coups de vent, je tiens, Monsieur, à exprimer la vive gratitude du Département pour les services importants que cet Office nous a rendus, pendant de longues années, en adressant ses avertissements, si hautement appréciés par la Marine Française et par nos populations du littoral.

Je m'empresse, d'ailleurs, d'ajouter que la nouvelle disposition énoncée dans la présente dépêche concerne seulement les avis de tempêtes ; et que l'Office de Londres continuera d'envoyer, dans les mêmes conditions que par le passé, la dépêche météorologique quotidienne donnant les pressions barométriques, la direction et la force du vent, l'état du ciel et celui de la mer.

Recevez, Monsieur, les assurances de ma considération la plus distinguée.

LE MINISTRE DE LA MARINE ET DES COLONIES.

Monsieur Robert Scott,
Secrétaire du Meteorological Office de Londres.

The Secretary was instructed to inform the Minister that the Council would be happy to continue the transmission of the daily *resumé* of weather as requested.

Submitted—The following report :—

REPORT on the INSPECTION of the IRISH and WELSH STATIONS in 1881.

I have to report that I have completed the inspection of the Irish and Welsh Stations, with the exception of one station (Waterford), which sends returns for the Weekly Weather Report, and of two stations of the Second Order (Londonderry and the Mountjoy Observatory), of which, however, the latter was inspected by Mr. Whipple.

TELEGRAPHIC REPORTING STATIONS.

St. Ann's Head.—Visited August 24. There is nothing calling for remark at this station, except that the observers had a tendency to set the barometer verniers too low, an error I have instructed them to avoid in future.

Holyhead.—Visited September 21. The Stevenson's screen recommended for this station in my last report had not arrived at the time of my visit, but it has been erected in the course of the current month (October). The station was otherwise quite satisfactory.

Parsonstown.—Visited September 23. The observer at this station has been changed, and Mr. G. Phillips now takes the readings. Dr. Bädikker, the astronomical assistant, takes great interest in the meteorological work. The thermometer screen has been raised since my last visit.

Valencia.—Visited October 5. There are no remarks to be made on this station, except that the attendance on our private wire at the Knightstown telegraph office is not as regular as is desirable. The attention of the Post Office authorities has been repeatedly called to this matter.

Roche's Point.—Visited October 6. This station was in a satisfactory condition. The erection of the Stevenson's screen and rain gauge on a plot of ground, kindly granted by Lord Fermoy, has been a great improvement on the conditions previously existing.

Mount Trenchard.—Visited October 7. This station only supplies temperature and rain returns for the Weekly Weather Report. It was in good order.

Donaghadee.—Visited October 10. The condition of this station was quite satisfactory. Mr. T. MacGowan, the observer, has evidently a great taste for science, and considerable knowledge, gained as teacher in a model school.

Mullaghmore.—Visited October 12. This station was as usual in complete order; but as to the erection of a private wire between the coastguard station and Cliffony (Minutes, July 20), I have been requested by Mr. Kerr to take no steps in the present unsettled state of the country, and of that part of the county Sligo especially, which might cause ill-will between the peasantry and the coastguard. If the present messengers were dismissed, the neighbours would at once believe that this had been done at the instigation of the coastguard. I have consulted Colonel Cooper and other local magistrates, who agree with the coastguard officer in recommending some delay.

STATIONS OF THE SECOND ORDER.

St. David's.—Visited August 23. This station was in a very satisfactory condition. Dr. Propert the observer, has offered to take "cirrus" observations, and as Mr. Walker, the former cirrus observer, has left St. Ann's Head, observations from this part of Wales will be valuable.

Dublin, Glasnevin.—Visited October 8. This station was in good order; the erection of the Stevenson's screen has improved the thermometrical indications materially. There is a great want of a good wind vane, and I have drawn the attention of the authorities to this defect.

Dublin, Fitzwilliam Square.—Visited October 8. I have nothing to remark about this station, which is as perfect as such a town station can be, the garden being very confined.

Colebrooke.—Visited October 12. There is nothing to be remarked; the station was in good order.

OBSERVATORIES.

Valencia.—Visited October 5. I am glad to say that the drainage effected last winter has been thoroughly efficient in drying the foundations of the west wall of the observatory. The only matter at present calling for attention is the state of the sea-retaining wall, some of the "pitching" of which has been loosened by the storms of last winter. I have instructed Mr. Cullum to procure an estimate for the work needed.

I regret to say that the boy employed at the observatory, M. Brennan, who had been for some months suffering from consumption, has died since the date of my visit. His work has been done by a substitute. I have ventured to allow Mr. Cullum to pay an extra sick allowance of 5*s.* per week from September 15, up to the date of his death.. I have to request your sanction to this arrangement.

Armagh.—Visited October 11. I have to request permission to order the instrument room to be painted, and to supply some requisite extra furniture.

I append a table of the thermometric comparisons. The sign thus + shows that the thermometers read higher than the Inspector's Standard, by the values quoted.

TELEGRAPHIC STATIONS.

——	Dry.	Wet.	Spare.	Max.	Min.
St. Ann's Head - - -	+0·3	+0·2	+0·1	−0·4	+0·4
Holyhead - - - -	0·0	+0·1	−0·5	+0·1	+0·1
Parsonstown - - -	+0·8	+0·5	—	+0·3	0·0
Valencia - - - -	+0·5	+0·6	—	+1·3	−0·2
Roche's Point - - -	+0·5	+0·3	—	+1·1	+0·2
Donaghadee - - -	+0·8	+0·8	+1·0	+0·9	+0·6
Mullaghmore - - -	+0·4	+0·4	+0·5	+0·6	+0·3

STATIONS OF THE SECOND ORDER, &c.

St. David's - - - -	+0·5	0·0	—	+0·4	−0·2
Mount Trenchard - - -	—	—	—	—	—
Glasnevin - - - -	+0·6	+0·7	—	+0·6	−0·8
Dublin, Fitzwilliam Square - -	+0·6	+0·5	+0·5	+0·0	−0·2
Colebrooke - - - -	+0·3	+0·4	—	+0·2	−0·1
Markree - - - -	+0·2	+0·1	—	+0·1	−0·6

October 26, 1881. ROBERT H. SCOTT.

The action taken by the Secretary at Valencia and Mullaghmore was approved.

Submitted—The following report:—

REPORT on OBSERVATORIES, 1881.

I beg respectfully to submit to the Meteorological Council the following report upon the present condition of the instruments at their self-recording observatories, visited on the days named.

Aberdeen, September 21–23.—All the instruments at this observatory were in good order. The barograph and thermograph clocks were cleaned, but not those of the anemograph or rain gauge, which did not require it.

The standard thermometers were compared and found to have the following corrections at 56° :

Dry, No. 458, 0°·0. Wet, No. 395, −0°·5

Mr. Boswell desires to be furnished with spare cylinders for the barograph and thermograph, in order that he may be able to entrust a deputy with the operation of changing the curves in his absence, and also of reducing the time now lost in the removal of the old paper and substitution of the new.

Armagh, September 26–28.—The barograph, thermograph, and anemograph at this observatory were all in good order, and were treated as usual. The pricker of the latter instrument was corrected for a slight time displacement.

The standard thermometers were compared and found to require the following corrections :

Dry bulb, No. 391, −0°·5. Wet bulb, No. 392, −0°·4.

The rain gauge was cleaned and the capacity of its receiver tested. This was found to be 0·139 inch only when measured by the jar, but on the latter being tested, it was found that 0·2 cubic inches of water by weight read 0·204 inch in the jar. It is therefore evident that both receiver and jar are at present slightly incorrect, but I cannot say whether the difference is sufficient to account for the difference of one inch in the total annual rainfall in 1880, stated to have been for Dr. Robinson's gauge 32·65 inches, and for the Beckley 33·65 inches.

Falmouth, October 10 *and* 11.—Owing to the death of the owner of the building and the embarrassed condition of his estate, this observatory appears to be in a somewhat neglected condition, and is in need of thorough renovation. The wooden supports for the thermograph screen and the framework supporting the anemometer are completely rotten and must be renewed immediately. Mr. Wilson Fox, the chairman of the Meteorological Committee of the Polytechnic Society, whose attention I drew to the matter, took steps at once with the view of having proper repairs executed.

The barograph was in good order and merely required cleaning, and the same was the case with the thermograph. The wet bulb trace was defective, and improved by scraping some of the black off the tube. The condition of the wet bulbs was unsatisfactory. I accordingly put on new muslin covers to both.

The corrections to the standard thermometers were determined to be, for the Dry, No. 383, −0°·3, and for the Wet, No. 388, −0°·1.

The anemograph was found to be in fair order, both fans had worked loose on the spindle and were striking the base plate of the instrument as they revolved ; this defect was rectified by putting in packing pieces and steadying pins.

The oil used for lubrication had very greatly thickened, and the sensitiveness of the instrument was somewhat impaired. This was easily restored by cleaning and fresh oil.

The rain gauge was in good order with the exception that the clock line was broken ; this was repaired and the clock cleaned. The shrubs in the garden in which the instrument is placed appear to have grown somewhat in the way of a free exposure of the gauge. Mr. Squire repeats the requests he made in 1877 to be supplied with a spare cylinder or cylinders for his barograph and thermograph.

Glasgow, September 17, 19, *and* 20.—The new standard barometer, Adie, 1,722, having been safely conveyed to the observatory by me, was placed in the transit room, on the opposite side of the north-west window to that already occupied by the old standard, precautions having been taken to shield it from the sun's rays. On Monday, the 19th, I made a set of comparisons between the two instruments, with the following results :—

New Standard Corrected.		Old Standard.		Error of Old Standard.		Observer.
Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	
29·6265	54·5	29·6152	55·5	−0·0113	+1°·0	G. M. W.
29·6265	54·5	29·6160	55·7	−0·0105	+1·2	J. Maclean.

I also examined the thermometers in use, and found their corrections to be as follows, deduced from readings of Kew standard thermometer :—

At 52°: dry standard, No. 472, −0°·3 ; wet standard, No. 403, 0°·6 ; max. M.O., No. 10, −0°·1 ; max. M.O., No. 10,579, 0°·0 ; min., 5,433, +0°·2 ; min., No. 1,222, +0°·5.

I had both barograph and thermograph clocks cleaned, and being again troubled with the stoppage of the former on being put together after cleaning, looked into the matter, and found that the defect was due to some faulty repairs executed many years ago by Mr. White, which require certain screws to be left slack when the light stop action is fitted on to the clock. This being now detected and noted, it is hoped stoppage from this cause may not occur again. The lenses and other parts of the instrument were in perfect order.

Both anemograph and rain-gauge were found in good order, only requiring the usual cleaning and oiling operations to be performed.

The condition of the muslin covers and threads of the wet bulbs was not quite satisfactory, but I was assured that they received the frequent attention necessary at Glasgow.

Kew.—All the self-recording instruments are in good order, and nothing is required in the way of repair or renewal.

Mr. Hicks is constructing a Stonyhurst discharging apparatus, which it is intended to fix experimentally on the Beckley gauge at Kew before applying it to the new gauge he is now constructing for the Hong Kong Observatory.

Holyhead, October 7.—The anemograph at this station was inspected at Mr. Scott's request. It was found to be maintained in excellent order. Two blades of one of the fans are somewhat corroded, but will not require renewal during the present year.

The cause of the occasional backward slipping of the velocity pencil was pointed out to Mr. Williams, and suggestions made to prevent its recurrence.

Mountjoy Observatory, Dublin.—This station was visited at Mr. Scott's request on September 29th; full particulars of the inspection have been already submitted to the Office.

Radcliffe Observatory, Oxford, July 21.—The barograph, thermograph, and rain-gauge were found all in good order, and giving excellent results. The velocity trace of the anemograph is irregular and unsatisfactory, from defects in the instrument, which is an old one, constructed on the 1858 model. The minimum thermometers had small quantities of alcohol in their chambers, and they were set right.

Stonyhurst, September 15.—The barograph, thermograph, and anemograph were all examined and found to be in excellent order, as was also the rain gauge, with this exception, the enamel of the funnel is cracked, and chips frequently break off, occasionally choking the tube. A new copper funnel would obviate this defect.

Valencia, October 3–5.—The only defective instrument at this Observatory is the anemograph. Owing to the exposure, wear, and tear, the working parts have become much deteriorated, and now it is evident renewal is necessary in places.

Three out of four of the cups are showing signs of yielding, one of the stays is broken but has been temporally repaired with wire. The fans are also partially loosened in the joints and the whole is much corroded. The top bearing also is defective, for being leaky it will not retain the oil poured into it. Two of the four bolts which fix the cover of the box containing the reducing gear are broken off in their holes, and will have to be drilled out. I was unable to do this on the occasion of my visit, but Mr. Cullum promised to call in the aid of Mr. Windler from the telegraph station.

The recording apparatus was cleaned, the lifter put in order, and the clock oiled.

The rain gauge had its spindle packed to prevent the excessive back leash, and the capacity of its receiver was tested against the measure used, and found correct.

The other instruments were in good order, merely the usual cleaning and oiling being required.

The corrections to the standard thermometers were found to be, for the dry, No. 399,—0°·5 and for the wet, No. 398.– 0°·4.

G. M. WHIPPLE.

Kew Observatory, October 27, 1881.

The Secretary was authorised to supply extra cylinders for the barograph and thermograph to each observatory.

He was further authorised to accept an estimate for repairs at Falmouth to the amount of 14*l.* 8*s.* (Letter 1799).

Read—Letter 1784 from Mrs. Ley, explaining that her husband would probably be unable to complete his tour of inspection before the spring, owing to a severe attack of illness. The Secretary stated that he had informed Mrs. Ley that arrangements would be made for the inspection of the stations left unvisited.—Approved.

Read—An application (Letter 1724) from Mr. Swainson, of the Observatory, Portsmouth Dockyard, for the supply of a rain gauge, to enable him to furnish rain returns to the health officer at Portsmouth.

The Secretary was instructed to ask Mr. Swainson what meteorological observations are at present carried on by him, and whether there is at the observatory any site available for a rain gauge.

Read—A letter (No. 1619) from Sir H. Brand, G.C.B., Speaker of the House of Commons, offering to the Council his sunshine records, which have been continued since 1879.

The Secretary was instructed to accept the offer made by Sir H. Brand, with the best thanks of the Council.

Resolved—That an *honorarium* of ten guineas be given to Mr. Kingston for his report on the Strathfield Turgiss thermometer experiments (Minutes, 1880, p. 131).

Reported—That three balloon ascents had been made by Captain Templer during the vacation (Minutes, July 20), that on two occasions he had been accompanied by a clerk from the Office, and that the average cost of each ascent had been eight guineas, exclusive of Captain Templer's own fee of one guinea per day (Letter 1845).

Read—A letter (No. 1572) from the Colonial Office, enclosing the Weather Report of the Island of Jamaica for the month of June (Minutes, p. 19).

Read—A memorandum from Captain Toynbee reporting that since the last meeting 32 logs had been received, 21 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. A. J. Brown -	Barque "Belle-isle."	Jan. 12—Aug. 7, 1881.	Aspinwall, Grey Town, Jamaica.	1880–81, p. 54.
Capt. J. Buchan -	Barque "Coppe-name."	June 1—Sept. 30, 1881.	Demerara - -	1881–82, p. 18.
Capt. C. M. Dobson	S.S. "Sunbeam"	May 28—July 20, 1881.	Odessa and home -	1881–82, p. 18.
Capt. J. Gordon -	S.S. "City of Agra."	June 22—Sept. 2, 1881.	Calcutta and home -	1881–82, p. 22.
Capt. D. Gray -	S.S. "Eclipse" -	March 16—July 24, 1881.	Greenland - -	1880–81, p. 54.
Capt. J. Gray -	S.S. "Hope" -	March 15—Aug. 4, 1881.	Do. - -	Do.
Capt. J. M. Gray -	Barque "Shun Lee."	Jan. 5—Oct. 18, 1881.	Hamburg, Iquique, and home.	1880–81, p. 96.
Capt. G. H. Jones -	S.S. "Lamperts"	Nov. 1, 1880—Aug. 20, 1881.	New York, Philadelphia, Bombay, Antwerp.	1880–81, p. 109.
Capt. J. Kidder -	S.S. "Fleurs Castle."	Jan. 12—July 12, 1881.	China, Japan, New York, Antwerp.	1880–81, p. 54.
Capt. J. F. L. P. Maclear, R.N., assisted by Sub-Lt. C. W. De La Poer Beresford, R.N.	H.M.S. "Alert"	Jan. 1—May 31, 1881.	Surveying Australia and coast of Pacific.	1880–81, p. 131.
Capt. J. Metcalfe -	S.S. "Oceanic"	Nov. 18, 1880—April 16, 1881.	San Francisco, Yokohama, and Hong Kong. 2 voyages.	1880–81, p. 122.
Capt. A. Murray -	S.S. "Windward"	March 3—Aug. 12, 1881.	Greenland - -	1880–81, p. 54.
Capt. W. Olver -	Barque "Prince Hassan."	Nov. 21, 1880—Aug, 28, 1881.	Brazil, New York, and home.	1880–81, p. 55.
Capt. H. Parsell -	S.S. "Baltic" -	March 2—Oct. 6, 1881.	New York. 7 voyages -	1880–81, p. 128.
Capt. R. Peebles -	Ship "Otago" -	Jan. 19—Sept. 21, 1881.	New Zealand and home -	1880–81, p. 96.
Capt. W. Scott -	Barque "Commewyne."	April 20—Sept. 14, 1881.	Surinam and home -	1881–2, p. 3.
Capt. W. C. Smith -	Barque "Kingdom of Sweden."	Dec. 30, 1880—Oct. 1, 1881.	Madras and home -	1880–81, p. 82.
Capt. W. Symington	S.S. "Hankow"	Jan. 11—Sept. 21, 1881.	Cape, India, Cape, Singapore, India, Mauritius, India, and home.	1880-81, p. 99.
Capt. J. Brown -	S.S. "Thetis" -	Feb. 12—Aug. 6, 1881.	Newfoundland, Greenland, and home.	—
Capt. L. C. Dart -	Barquentine "Fylde."	May 4, 1880—July 28, 1881.	United States, South America, Canada, and home.	—
Capt. E. J. Molony	Ship "British Merchant."	Nov. 5, 1880—Sept. 9, 1881.	Melbourne, San Francisco	—

Mr. Scott was instructed to present the charts (O. 27) to Captains Brown, Dart, and Molony, and to convey the best thanks of the Council to the other observers.

Submitted—The following quarterly report:

SIR, Meteorological Office, September 30, 1881

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 30th September 1881.

Sea Surface Temperature Charts.

Indian Ocean.—The charts for this ocean have been completed so far as the data in this Office are concerned. I now purpose filling up the vacant spaces from the Remark Books of H.M. ships.

Atlantic Ocean.—Charts for this ocean are in progress. The North Atlantic Chart for the month of August and the South Atlantic Chart for the month of February will be completed during the next month.

I am, &c.

Capt. H. Toynbee, F.R.A.S., &c., Marine Superintendent.

(Signed) C. W. BAILLIE, Navg. Lieut. R.N.

Submitted—The Sea Surface Temperature Chart of the Indian Ocean for the month of November by Mr. Baillie.

Submitted—(1) A proof of the explanation intended to accompany the charts of the Cape District; and (2) the following statement of the present condition of the charts:—

Current Charts.—First corrections have been made, and they are ready to go to press when the number to be struck off is known.

Wind Charts.—Have gone for revise and to have their marginal notes written in by the lithographer.

Key Charts. Do do. do.

Specific Gravity, Ice, and Passage Charts.—Ready to go for revise, and marginal notes to be written when Mr. Galton has seen the notes.

28th October 1881. HENRY TOYNBEE.

Reported—That Mr. Rampini, the Sheriff Substitute of Shetland, had applied for storm warnings for Lerwick and Scalloway, and that the request had been granted, but not without hesitation, owing to the uncertainty necessarily attaching to warnings issued to stations lying so far to the north (Letters received, 1568, 1653, 1723, 1841; written, 1688, 1765, 1937, and 2002).—Approved.

The Secretary reported that on the 18th instant he had been asked by the Meteorological Society if the Council intended to undertake a detailed discussion of the storm of the 14th instant, and had replied that he did not think that such an inquiry could be immediately undertaken, as the time of the staff was fully occupied, but that the Council would probably be willing to place at the disposal of the Society any observations bearing on the phenomena of the storm which the Office might receive. He also reported that the Meteorological Society had resolved to undertake the discussion; and submitted a letter (No. 1875), from Mr. C. Harding, asking permission to make use on behalf of the Society of any marine observations relating to the gale which might reach the Office.

Resolved—I. That the Meteorological Society be allowed the use of any observations in the Office relating to the storm of October 14. II. That a history of the storm be prepared in the Office for future use.

Submitted—The following:

REPORT on the HAY HARVEST FORECASTS, 1881.

I beg to submit herewith a report on the result of the Hay Harvest Forecasts for 1881.

The printed forms issued to the various recipients have been filled up with greater regularity and detail than was the case last year, and in most instances the returns sent in seem to afford a very fair idea of the actual weather that prevailed in the different localities.

The final result of the checking shows that the general percentage of success (76) is precisely the same as in 1880, but that the proportion of *completely* successful forecasts, as distinguished from those which are only partially successful, is decidedly smaller than it was then. This is especially the case in in "Scotland, E." and "England, N.E." The percentage of success in "Ireland, N." has been materially reduced by the very low values attained at Hollymount, Co. Mayo, and as the weather reported from that locality is confirmed by our own working charts, it is fair to assume that for the western part of the district the Forecasts were by no means successful.

The largest percentage of complete success has been reached in "England, E.," the Midland Counties, and "England, S."

The following is a brief resumé of the larger table on p. 57.

SUMMARY of RESULTS.

Districts.	Names of Stations.	Percentages.				Total Percentage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N. - -	Golspie and Drynie - -	32	40	26	2	72
„ E. - -	Glamis and Longniddry - -	21	62	13	4	83
ENGLAND, N.E. -	Morpeth and Ulceby - -	22	42	31	5	64
ENGLAND, E. - -	Thorpe and Rothamsted - -	35	49	12	4	84
MIDLAND COUNTIES -	Cirencester and Gerrard's Cross -	34	50	16	—	84
ENGLAND, S. - -	Maidstone and Downton -	33	50	14	3	83
SCOTLAND, W. -	Drymen, Islay, and Stranraer -	28	48	20	4	76
ENGLAND, N.W. -	Leyburn and Prescot - -	28	46	22	4	74
ENGLAND, S.W. -	Bridgend (Glamorgan), Falfield, Clifton, and Glastonbury.	29	43	24	4	72
IRELAND, N. - -	Antrim, Hollymount, and Moynalty.	23	46	26	5	69
„ S. - -	Moneygall, New Ross, and Ardfert Abbey.	30	44	23	3	74
	Mean for all districts -	29	47	21	3	76

In a communication to the Office, Mr. J. R. Mitchell, of Drynie, observed that the Forecasts this year were remarkably correct; and, similarly, Colonel Turbervill, of Bridgend, Glamorganshire, reported that they were so fully appreciated by the farmers in that neighbourhood, that he had determined to continue the telegrams at his own expense at the time of wheat harvest.

HAY HARVEST FORECASTS, 1881.

RETURN showing the NUMBER of FORECASTS sent to each of the under-mentioned PERSONS, with the SUCCESS or otherwise of the FORECASTS.

Districts.	To whom sent.	Address.	No. of Forecasts sent.	No. of Forecasts checked.	Percentages.				Remarks.
					Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
0. SCOTLAND, N.	— Melville, for the Rev. Dr. Jass	Dunrobin Garden, Golspie	36	29	27·6	41·4	26·6	3·4	
	J. R. Mitchell	Drynie, Inverness	33	33	36·4	39·4	24·2	—	Mr. Mitchell writes: "The Reports have been remarkably correct this season."
1. SCOTLAND, E.	G. Johnstone	Glamis, by Forfar	36	35	20·0	62·9	14·3	2·8	
	W. S. Macdonald	Craigielaw, Longniddry	36	34	20·6	61·8	11·7	5·9	
2. ENGLAND, N.E.	J. Wilson	Woodhorn Manor, Morpeth	34	—	—	—	—	—	No returns sent in.
	J. Turner	The Grange, Ulceby	36	36	22·2	41·7	30·6	5·5	
3. ENGLAND, E.	W. Birkbeck	Thorpe, Norwich	23	21	42·9	38·1	14·3	4·7	
	J. B. Lawes and J. H. Gilbert.	Rothamsted, Harpenden	36	29	27·6	58·6	10·4	3·4	
4. MIDLAND COUNTIES	J. Loring, for Professor Ohm	Dyer Street, Cirencester	36	35	31·4	51·4	17·2	—	
	C. King, for the Duke of Somerset.	Gerrard's Cross, Bucks	36	35	37·1	48·6	14·3	—	
5. ENGLAND, S.	C. Whitehead	Barming House, Maidstone	36	35	42·9	42·9	11·4	2·8	
	E. P. Squarey	The Moot, Downton, Wilts	36	35	22·9	57·1	17·1	2·9	
6. SCOTLAND, W.	C. H. H. Wilsone, of Dalnair.	Endrick Bank, Drymen	36	35	22·9	54·3	20·0	2·8	
	J. S. R. Ballingal	Eallabus House, Islay	36	35	28·6	48·6	20·0	2·8	
	J. Chisholm	Chapel Rossan, Stranraer	36	35	31·4	42·9	20·0	5·7	
7. ENGLAND, N.W.	G. W. Wray	Leyburn, York	30	28	32·2	46·4	14·3	7·1	
	The Earl of Derby, per F. Harrison.	Knowsley Hall, Prescot	30	29	24·2	44·8	31·0	—	
8. ENGLAND, S.W.	Colonel J. B. Turbervill.	Ewenny Priory, Bridgend, Glamorgan.	26	25	36·0	48·0	12·0	4·0	
	J. Harle, for the Earl of Ducie.	Whitfield, Falfield, R.S.O.	36	35	25·7	42·9	31·4	—	
	T. Dyke	Long Ashton, Clifton, Bristol	36	35	31·4	31·4	34·3	2·9	
	R. Neville	Butleigh Court, Glastonbury	36	33	24·2	48·5	18·2	9·1	
9. IRELAND, N.	W. M. Kirk, per J. Hanson.	The Bush, Antrim	30	30	26·7	50·0	23·3	—	
	J. Simson	Kilrush, Hollymount, Co. Mayo	30	30	10·0	53·3	20·0	16·7	
	C. C. Hamilton	Cherrymount, Moynalty, Co. Meath	30	29	31·0	34·5	34·5	—	
10. IRELAND, S.	D. A. M'Cready	Loughton, Moneygall, King's Co.	30	30	30·0	53·4	13·3	3·3	
	D. A. Milward	New Ross, Co. Wexford	30	29	17·2	48·3	27·6	6·9	
	W. Talbot Crosbie, per W. Bradshaw.	Ardfert Abbey, Tralee, Co. Kerry	27	26	42·3	30·8	26·9	—	

Read—The following letter:—

DEAR SIR, Ewenny Priory, Bridgend, Glamorgan, August 29, 1881.

I HELD my rent audit for Lady Day last to-day, when some of the tenants spoke as to the benefit they had derived from the "Hay Harvest Forecasts," and their regret that they had none to guide them now, so I said I would get them continued for another three weeks.

I therefore enclose a Post Office order for 20*s.* 6*d.* for forecasts, &c., and should feel obliged if you would again forward them, commencing the day after this reaches you by the 31st, and continue them up to the 20th inclusive.

I believe this is in accordance with the contents of your letter of the 30th July; if not, please correct me.

I am, &c.

R. Scott, Esq. (Signed) T. P. TURBERVILL, (Colonel).

Submitted—The following report on the forecasts for July 1881:—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

3 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	19	38	29	77
"	b	58	38	48	
"	c	15	12	13	
"	d	8	12	10	
SCOTLAND, E.	a	31	38	35	73
"	b	38	39	38	
"	c	27	4	16	
"	d	4	19	11	
ENGLAND, N.E.	a	19	39	29	71
"	b	42	42	42	
"	c	31	15	23	
"	d	8	4	6	
ENGLAND, E.	a	35	46	41	75
"	b	42	27	34	
"	c	12	12	12	
"	d	11	15	13	
MIDLAND COS.	a	23	38	31	63
"	b	46	19	32	
"	c	23	31	27	
"	d	8	12	10	
ENGLAND, S.	a	23	46	35	67
"	b	46	19	32	
"	c	23	23	23	
"	d	8	12	10	
SCOTLAND, W.	a	19	42	31	71
"	b	42	38	40	
"	c	27	12	19	
"	d	12	8	10	
ENGLAND, N.W.	a	27	39	33	75
"	b	38	46	42	
"	c	23	15	19	
"	d	12	—	6	
ENGLAND, S.W.	a	24	27	26	68
"	b	38	46	42	
"	c	19	23	21	
"	d	19	4	11	
IRELAND, N.	a	31	50	41	71
"	b	31	30	30	
"	c	30	12	21	
"	d	8	8	8	
IRELAND, S.	a	20	38	29	70
"	b	46	35	41	
"	c	19	15	17	
"	d	15	12	13	

8 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	23	49	36	80
"	b	55	32	44	
"	c	19	13	16	
"	d	3	6	4	
SCOTLAND, E.	a	26	45	36	67
"	b	39	23	31	
"	c	25	26	25	
"	d	10	6	8	
ENGLAND, N.E.	a	29	39	34	76
"	b	45	39	42	
"	c	23	16	20	
"	d	3	6	4	
ENGLAND, E.	a	42	36	39	67
"	b	26	29	28	
"	c	29	16	22	
"	d	3	19	11	
MIDLAND COS.	a	29	29	29	75
"	b	42	49	46	
"	c	19	19	19	
"	d	10	3	6	
ENGLAND, S.	a	23	45	34	81
"	b	48	45	47	
"	c	16	—	8	
"	d	13	10	11	
SCOTLAND, W.	a	13	52	33	70
"	b	58	16	37	
"	c	19	22	20	
"	d	10	10	10	
ENGLAND, N.W.	a	36	32	34	73
"	b	29	49	39	
"	c	25	16	21	
"	d	10	3	6	
ENGLAND, S.W.	a	16	29	23	68
"	b	45	45	45	
"	c	26	19	22	
"	d	13	7	10	
IRELAND, N.	a	32	55	44	73
"	b	32	26	29	
"	c	26	10	18	
"	d	10	9	9	
IRELAND, S.	a	26	48	37	68
"	b	39	23	31	
"	c	19	23	21	
"	d	16	6	11	

SUMMARY.

BRITISH ISLES	a	25	40	33	71
"	b	42	34	38	
"	c	23	16	19	
"	d	10	10	10	
BRITISH ISLES	a	27	42	35	73
"	b	42	34	38	
"	c	22	16	19	
"	d	9	8	8	

Submitted—The following report on the forecasts for August 1881:—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

3 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	37	44	41	76
"	b	34	37	35	
"	c	22	15	19	
"	d	7	4	5	
Scotland, E.	a	37	30	34	74
"	b	33	48	40	
"	c	15	15	15	
"	d	15	7	11	
England, N.E.	a	19	41	30	80
"	b	55	44	50	
"	c	15	15	15	
"	d	11	—	5	
England, E.	a	19	37	28	76
"	b	59	37	48	
"	c	11	22	16	
"	d	11	4	8	
Midland Cos.	a	30	37	34	80
"	b	48	44	46	
"	c	11	15	13	
"	d	11	4	7	
England, S.	a	19	41	30	86
"	b	70	41	56	
"	c	7	11	9	
"	d	4	7	5	
Scotland, W.	a	26	41	34	67
"	b	37	30	33	
"	c	30	15	23	
"	d	7	14	10	
England, N.W.	a	30	48	39	84
"	b	41	48	45	
"	c	22	4	13	
"	d	7	—	3	
England, S.W.	a	30	44	37	84
"	b	56	37	47	
"	c	7	15	11	
"	d	7	4	5	
Ireland, N.	a	8	44	26	65
"	b	44	33	39	
"	c	44	19	31	
"	d	4	4	4	
Ireland, S.	a	11	37	24	67
"	b	56	30	43	
"	c	22	30	26	
"	d	11	4	7	

8 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	19	42	31	66
"	b	45	26	35	
"	c	36	23	30	
"	d	—	9	4	
Scotland, E.	a	29	29	29	74
"	b	35	55	45	
"	c	26	10	18	
"	d	10	6	8	
England, N.E.	a	26	26	26	76
"	b	45	55	50	
"	c	16	16	16	
"	d	13	3	8	
England, E.	a	3	29	16	74
"	b	71	45	58	
"	c	23	19	21	
"	d	3	7	5	
Midland Cos.	a	26	23	25	60
"	b	26	45	35	
"	c	42	19	31	
"	d	6	13	9	
England, S.	a	22	29	26	81
"	b	68	42	55	
"	c	10	23	16	
"	d	—	6	3	
Scotland, W.	a	23	26	25	68
"	b	42	45	43	
"	c	19	13	16	
"	d	16	16	16	
England, N.W.	a	29	39	34	76
"	b	48	35	42	
"	c	13	19	16	
"	d	10	7	8	
England, S.W.	a	32	61	47	81
"	b	42	26	34	
"	c	19	10	14	
"	d	7	3	5	
Ireland, N.	a	23	42	33	73
"	b	39	42	40	
"	c	19	13	16	
"	d	19	3	11	
Ireland, S.	a	13	45	29	76
"	b	55	39	47	
"	c	19	13	16	
"	d	13	3	8	

Summary.

British Isles	a	24	40	32	76
"	b	48	39	44	
"	c	19	16	17	
"	d	9	5	7	
British Isles	a	22	36	29	73
"	b	47	41	44	
"	c	22	16	19	
"	d	9	7	8	

Resolved—In answer to an application from the Meteorological Society (Letter 1400), that the sum of 25*l.* be allowed to them for inspections, as in the two previous years (Minutes, 1880, p. 87).

Read—A letter from Mr. Whipple (No. 1508), inquiring if the thermometer screen experiments were to be continued at Kew for a third year (Minutes, 1879, p. 2). The Secretary was instructed to ask Mr. Whipple for his opinion on the subject.

Reported—That the observations on Ben Nevis had ceased for the winter on the 26th instant (Minutes, p. 30).

SUBMITTED—The following STATEMENT respecting the RECORDS for March 1881, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :—														
Action	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
other causes	0	0	0	0	*10 †146	*10	0	0	0	0	0	*15	0	0
Orientation verified	—	—	30th	—	25th	—	26th	—	2nd	—	15th	—	14th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	1	0	4	0	2	0	1	0	6	0	0	1	11
Result of 40 *Remeasurements* :—														
Greatest difference	1·0	1·0	1·0	1·0	0·0	1·0	2·0	1·0	1·0	1·0	1·0	1·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·5	0·0	0·4	0·0	0·6	0·1	0·5	0·1	0·5	0·1	0·3	0·0	0·6
Residual difference (—Meteorological Office)	0·0	—0·1	0·0	+0·2	0·0	0·0	0·0	+0·2	0·0	+0·2	+0·1	+0·1	0·0	+0·1
RAIN GAUGE :—														
Action	Good.		Good.		Bad.		Indifferent.		Indifferent.		Good.		Indifferent.	
Records deficient, due to stoppage of clock	0		0		0		0		0		0		0	
„ „ other causes	0		0		0		0		0		0		§24 hrs.	
Errors in tabulation	0		0		0		0		1		1		0	

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Indifferent.	Indifferent.	Do.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0	0	7	0
„ „ failure of light	1 hr.	0	1 hr.	0	0	0	0
„ „ other causes	¶1 hr.	‡1 hr.	0	0	‡3	{**18 ‖1}	0
No. of errors discovered—							
In entry of standard	0	0	0	5	2	1	0
„ calculating residual correction	0	1	0	1	0	0	0
„ applying residual correction	0	1	1	7	3	2	0
„ subtraction in subsidiary tables	0	0	0	0	2	0	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	1	0	1	2	0	3	0
Result of 40 *Remeasurements :—*							
Greatest difference	·006	·005	·005	·007	·006	·004	·005
Mean difference irrespective of sign	·002	·003	·002	·003	·002	·002	·002
Residual difference (—Meteorological Office)	·000	·000	—·001	+·001	·000	·000	·000
Mean monthly difference between simultaneous barograph and barometer readings	·002	·002	·001	·002	·002	·002	·002

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Indifferent.		Do.		Do.		Do.		Indifferent.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ failure of light	1	1	0	0	0	0	0	0	0	8	0	0	3	0
„ „ imperfectly moistened bulbs	—	37 hrs.	—	0	—	6	—	10	—	2	—	5	—	2
„ „ partially frozen bulbs	—	58 hrs.	—	30	—	6	—	50	—	33	—	16	—	0
„ „ other causes	—	†1 hr.	‡18	‡18	0	0	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	1	0	2	0	1	0	1	0	0	2	0	1	1
„ „ by subsidiary measurements	0	0	0	0	0	0	1	3	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	0	1	1	0	1	5	2	0	0	0	3	2
„ „ detected under glass scale	1	0	1	4	2	1	1	5	11	6	0	2	3	0
Result of 40 *Remeasurements :—*														
Greatest difference	0·3	0·2	0·2	0·2	0·3	0·2	0·3	0·3	0·4	0·4	0·2	0·3	0·2	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·2	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	—0·1	+0·1	+0·1	0·0	0·0	0·0	0·0	—0·1	—0·2	—0·1	0·0	0·0	+0·1	0·0
Mean monthly difference between simultaneous thermograph and thermometer readings	0·1	0·1	0·1	0·2	0·1	0·1	0·2	0·3	0·1	0·1	0·1	0·2	0·1	0·2
No. of errors in maxima and minima	0	—	5	—	1	—	1	—	12	—	3	—	2	—

* Frost. † Instrument being repaired. ‡ Photographic imperfections. ** Lamp glass blackened by smoke. § Tube choked by dirt. †† Shutter stopped clock. ‖ Cleaning clock. ¶ Changing curves.

SUBMITTED—The following STATEMENT respecting the RECORDS for April 1881, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :—														
Action - - - - - - -	Direction. Good.	Velocity. Good.	Direction. Good	Velocity. Good	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good	Velocity. Good.	Direction. Good	Velocity. Good.
Records deficient, due to stoppage of clock -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ other causes - -	0	0	*1	0	0	0	0	0	0	0	0	0	0	0
Orientation verified - - - - -	14th	—	30th	—	21st	—	30th	—	8th	—	—	—	7th	—
No. of errors discovered by subsidiaries -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	2	0	0	3	1	5	4	0	2	8	0	0	1	17
Result of 40 *Remeasurements :—*														
Greatest difference - - - -	0·0	1·0	0·0	1·0	0·0	2·0	0·0	1·0	1·0	1·0	1·0	1·0	1·0	2·0
Mean difference irrespective of sign - -	0·0	0·4	0·0	0·5	0·0	0·6	0·0	0·3	0·1	0·4	0·0	0·4	0·1	0·9
Residual difference (— Meteorological Office) -	0·0	0·0	0·0	0·0	0·0	−0·1	0·0	0·0	−0·1	+0·1	0·0	+0·2	0·0	0·0
RAIN GAUGE :—														
Action - - - - - - -	Good.		Good.		Indifferent.		Good.		Good.		Good.		Indifferent.	
Records deficient, due to stoppage of clock -	0		0		0		0		0		0		0	
„ „ other causes - -	0		0		0		0		0		0		0	
Errors in tabulation - - - -	0		0		0		1		1		1		0	

BAROGRAPH:—															
Action			Good.		Good.		Good.		Good.		Good.		Good		Good.	
Photography			Do.		Do.		Indifferent.		Indifferent.		Do.		Do.		Do.	
Records deficient, due to stoppage of clock			0		0		0		0		0		0		0	
„ „ failure of light			0		0		3 hrs.		0		0		2 hrs.		0	
„ „ other causes			0		0		0		0		0		†1 hr.		0	
No. of errors discovered—																
In entry of standard			0		1		0		1		1		2		0	
„ calculating residual correction			1		0		1		1		0		0		0	
„ applying residual correction			0		0		0		0		1		1		5	
„ subtraction in subsidiary tables			0		0		0		2		0		0		0	
„ tabulation by subsidiaries			0		0		0		0		0		0		0	
„ „ irregular differences			0		0		0		4		1		0		1	
***Result of* 40 *Remeasurements*:—**																
Greatest difference			0·005		0·005		0·006		0·005		0·005		0·004		0·005	
Mean difference irrespective of sign			0·002		0·002		0·002		0·002		0·002		0·002		0·002	
Residual difference (— Meteorological Office)			0·000		0·000		—0·001		—0·001		0·000		0·000		+0·001	
Mean monthly difference between simultaneous barograph and barometer readings			0·002		0·002		0·001		0·002		0·002		0·001		0·001	
THERMOGRAPH:—																
Action			Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography			Do.		Do.		Do.		Do.		Do.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	2	3	0	0	1	0	0	0	0	0	0	0
„ „ imperfectly moistened bulbs	—	17	—	0	—	21	—	7	—	17	—	13	—	0		
„ „ partially frozen bulbs	—	25	—	12	—	0	—	10	—	6	—	10	—	0		
„ „ other causes	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
No. of errors discovered in entry of standard	0	0	0	0	0	2	2	1	0	0	0	0	2	2		
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
„ „ of subtraction in do. tables	0	1	0	0	1	1	0	5	0	4	0	0	1	3		
„ „ detected under glass scale	2	0	1	1	2	3	0	8	25	3	0	2	1	0		
***Result of* 40 *Remeasurements*:—**																
Greatest difference	0·3	0·2	0·2	0·2	0·3	0·3	0·2	0·3	0·3	0·3	0·2	0·3	0·3	0·3		
Mean difference irrespective of sign	·1	·1	·1	·1	·1	·1	·1	·1	·2	·1	·1	·1	·1	·1		
Residual difference (— Meteorological Office)	—·1	+·1	0	0	0	—·1	0	—·1	—·2	—·1	0	0	+·1	0		
Mean monthly difference between simultaneous thermograph and thermometer readings	0·1	0·2	0·2	0·2	0·1	0·1	0·2	0·3	0·1	0·2	0·1	0·2	0·1	0·2		
No. of errors in maxima and minima	0	—	0	—	0	—	1	—	11	—	1	—	0	—		

* Pencil failed to mark.

† Light set on clamp.

Submitted—An application (Letter 1492) from the Meteorological Commission of the Cape of Good Hope for the publications of the Office.—Granted.

October 26th, 1881.

STATEMENT of WORK done in MARINE ROOM from July 1st to October 15th, 1881.

Examined 33 new logs and 1 lighthouse register.

Cape of Good Hope District.

Wind.—Examination of proofs of large charts completed. Explanation, marginal notes, and 1° isotherms added, and January sent to lithographer for specimen of explanation and marginal notes. Index charts (with explanation and marginal notes, and 1° isotherms added) sent for revise. Summer, winter, and generalized diagrams drawn for insertion in letterpress.

Currents.—Explanation, marginal notes, and 1° isotherms added to charts and forwarded to lithographer. Revise of all charts received and examined, and now ready for press. Index charts (with explanation, marginal notes, and 1° isotherms added) sent for revise.

Summer, winter, and generalized diagrams drawn for insertion in letterpress.

Specific Gravity, Passage and Ice.—Chart drawn and forwarded to lithographer.

Letterpress.—Reading proof, including tables of Wind and Weather.

Considerable time occupied in preparation of subject-matter for letterpress, preparing for printer, &c.

Compiling generalized tables of Weather, Nimbus, and Sea or Swell for quarters and for the year.

Cape Gales.—Gales for all months classified, and diagrams of extreme force drawn.

General.

Assistance given by staff of Marine Room to Lieutenant Baillie in the discussion of sea temperatures for the Atlantic and Indian Ocean.

Index of data in Ocean 10° squares posted to date.

Ballon ascents and work connected with observations.

CHAS. HARDING.
HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq.

October 15, 1881.

STATEMENT of WORK done in the PANTAGRAPH ROOM from July 1st to October 15th.

Copper Plates pantagraphed:—21 plates, Nos. 60 to 73, 1876; Nos. 67 to 73, 1880.

Zinc Plates:—Barograms, 12 plates, Nos. 65 to 73, 1876; Nos. 1 to 3, 1877; Thermograms, 12 plates, Nos. 65 to 73, 1876; Nos. 1 to 3, 1877; Vapour Tension, 20 plates, Nos. 61 to 73, 1876; Nos. 1 to 2, 1877; Nos. 69 to 73, 1880; Anemograms, 18 plates, Nos. 62 to 73, 1876; Nos. 1 to 6, 1877; Rain Curves, 19 plates, Nos. 61 to 73, 1876; Nos. 1 to 6, 1877.

The photographic curves are prepared for the pantagraphs for about a month in advance of the zinc plates.

The Harmonic Analysis of the 1871 temperature curves has been completed; and the 1872 curves for Valencia, Armagh, and Glasgow are also finished.

In the interval covered by this report the usual summer vacation has been taken.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

October 15, 1881.

EXAMINATION ROOM.

SIR,

SINCE the date of my last Report (June 30th), the following curves and tabulations have been examined:—

February: *Thermograms*, one station; *Barograms*, five stations; *Anemograms*, one station.
March: *Thermograms*, five stations; *Barograms*, six stations; *Anemograms*, seven stations.
April: *Thermograms*, seven stations; *Barograms*, seven stations; *Anemograms*, seven stations.
May: *Thermograms*, seven stations; *Barograms*, two stations.

The notes of errors and monthly reports thereon for *February*, *March*, and *April*, have been written out. The data required for the reports of the Registrar General for Ireland for the months June—September have also been prepared.

The greater part of the annual vacation has been taken by the staff during the period under notice.

I am, &c.
T. E. ALLEN.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary.

Reported—That the following boys had been engaged as temporary clerks: On the 22nd August, G. N. Huntley, at 12*s.* a week, in the place of A. J. Strahan, resigned, and on the 24th October, A. Wood, at 7*s.* a week, in the place of A. J. Woolston, resigned. Both engagements for eight hours work daily.

Reported—That Mr. H. Chivers had died on the 25th instant unexpectedly of disease of the heart.

Submitted—The following statement of accounts for the quarter ending 30th September 1881 :—

Income.	£ s. d.	£ s. d.
Balance from year 1880–1		1,401 14 10
Proportion of vote for quarter		7,500 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	11 16 8	
(2.) Special researches	3 13 6	
(3.) Observatories and stations	10 0 0	
		25 10 2
Supply of Weather Information :		
D.W. charts and forecasts	141 18 1	
8h. 30m. p.m. charts	12 10 0	
Information for Press Agencies, &c.	48 2 8	
Telegrams	139 13 2	
		342 3 11
Supply of Ocean statistics		2 11 0
„ Miscellaneous data		5 10 6
Sale of Instruments, &c. :		
Mercantile Marine account		28 19 7
Commission charged on work done for Colonies, &c.		12 4 11
		£9,318 14 11

Expenditure.	£ s. d.	£ s. d.
Administration :		
Payment of Council	500 0 0	
Secretary	400 0 0	
Salaries and wages	353 16 7	
Rent, fuel, and lighting	320 9 8	
Furniture and fittings	123 6 8	
Incidental and contingent expenses	186 16 7	
		1,884 9 6
*Special Researches :		
Mr. Burton's salary	62 5 6	
Rainfall observations	200 0 0	
Sundry charges	166 1 2	
		428 6 8
Land Meteorology :		
Observations and stations	1,255 11 8	
Discussion and reduction of observations	750 8 4	
		2,006 0 0
Weather Information and Forecasts :		
Telegraphic reports and storm warnings	1,419 6 6	
Preparation and issue of reports and forecasts	742 8 10	
		2,161 15 4
Inspections :		
Salaries and travelling expenses		285 2 9
Ocean Meteorology :		
Discussion and reduction of observations	700 16 10	
Expenses incidental to the supply of instruments :		
Proportion for care and issue of instruments	100 0 0	
Royal Navy	192 9 9	
Mercantile Marine	164 1 11	
Distant island and coast stations	11 13 0	
		1,169 1 6
Balance		1,383 19 2
		£9,318 14 11

Liabilities.	£ s. d.
To Council	500 0 0
„ Post Office (partly estimated)	370 4 8
„ sundry creditors	689 4 4
„ „ (contracts or work uncompleted)	156 18 0
„ balance	1,383 19 2
	£3,100 6 2

Assets.	£ s. d.
By cash at Bank	1,885 10 2
„ „ at Office	232 5 10
„ „ at Valencia	50 0 0
„ H.M. Exchequer	500 0 0
„ sundry debtors	432 10 2
	£3,100 6 2

* Exclusive of 40*l.* advanced to Captain Templer for balloon experiments, *on account*.

The following cheques for July were drawn on the 30th of that month :—

	£	s.	d.	£	s.	d.
Administration:						
R. H. Scott, salary				66	13	4
J. S. Harding, jun. } Salaries and wages	27	15	6			
T. D. Bell }	13	6	8			
J. S. Harding, sen. }	*11	4	7			
				52	6	9
The Gas Light and Coke Company, gas				1	14	0
Atkinson & Co., furniture				5	12	9
Harvey, Nichols, & Co., carpets, &c.				7	5	5
F. Hatchett, copying apparatus				1	5	0
Pickford & Co., carriage of parcels				1	17	6
Special Researches:						
C. E. Burton, salary				*10	10	0
W. C. Ley, post cards for "cirrus" observations				1	8	0
W. J. Russell, fog experiments				5	16	3
E. I. Strachan, Arctic work				3	5	3
G. J. Symons, rainfall observations				200	0	0
G. M. Whipple, fog observations				2	6	0
Land Meteorology:						
R. & J. Beck, zinc plates				13	6	6
J. E. Cullum, salary				16	13	4
G. M. Whipple, postages, &c.				2	1	10
R. H. Curtis } Discussion, &c. of Observations.	22	4	5			
J. A. Curtis }	15	11	1			
T. E. Allen }	15	11	1			
C. H. Thompson }	11	10	0			
E. G. Aldridge }	9	3	4			
				73	19	11
Weather Information and Forecasts:						
Postmaster General, telegrams				139	2	1
F. Dangerfield, delivery of D.W. charts				11	10	7
Wightman & Co., wrappers and printing				8	7	6
F. Gaster } Preparation &c. of Weather Reports.	31	13	6			
W. L. Dallas }	19	15	1			
F. Brodie }	19	15	1			
R. Sargent }	†9	9	0			
H. W. Chivers }	*8	5	0			
				88	17	8
Inspections:						
W. C. Ley, travelling expenses				38	6	2
For Ocean Meteorology:						
Capt. H. Toynbee } Discussion, &c. of observations, and care of instruments.	33	6	8			
R. Strachan }	27	15	6			
C. Harding }	22	4	5			
H. Harries }	14	0	0			
Lieut. C. W. Baillie, R.N. }	16	13	4			
				113	19	11
G. M. Whipple, verifications	7	5	0			
" "	3	13	0			
				10	18	0
Nautical Magazine, advertisements				1	2	6
Pewtress & Co., printing				3	15	0
J. H. Woodstock, packing cases				2	17	0
P. A. Feathers, Dundee agent				3	15	0
Z. Scaping, Hull agent				3	12	6
Carried forward				£892	5	9

* Five weeks to 30th July.

† Four weeks to 30th July.

	£ s. d.	£ s. d.
Brought forward -	- -	892 5 9
For Ocean Meteorology—*cont.*		
J. Gill, Liverpool agent - - -	- -	15 15 7
T. M. Almond, London agent - - -	- -	2 10 0
C. H. Permain, Southampton agent - -	- -	7 16 6
H. J. Thatcher, Cardiff agent - - -	- -	1 14 3
D. McGregor & Co., Glasgow agents - -	- -	5 2 9
T. Rossiter, Norfolk Island observations -	- -	6 5 0
P. Riddle, Bermuda „ -	- -	4 11 0
Miscellaneous:		
Thos. De La Rue & Co., commissions - -	- -	11 2 6
J. J. Hicks „ - -	- -	1 15 0
G. M. Whipple „ - -	- -	6 2 0
J. S. Harding, jun., petty cash - -	100 0 0	
„ „ - -	80 0 0	
	—— ——	180 0 0
Total -		£1,135 0 4

The following cheques for August were drawn on the 31st of that month:—

	£ s. d.	£ s. d.
Administration:		
R. H. Scott, salary - - - -	- -	66 13 4
J. S. Harding, jun. } Salaries and wages -	27 15 6	
T. D. Bell - - }	13 6 8	
J. S. Harding, sen. }	*8 19 8	
	——	50 1 10
Pall Mall Coal Company, coals - -	- -	12 0 0
Special Researches:		
C. E. Burton, salary - - - -	- -	*8 8 0
E. I. Strachan, Arctic work - - -	- -	5 16 3
G. M. Whipple, thermometer experiments -	- -	10 0 0
Land Meteorology:		
J. E. Cullum, salary - - - -	- -	16 13 4
R. H. Curtis - }	22 4 5	
J. A. Curtis -	15 11 1	
T. E. Allen -	15 11 1	
C. H. Thompson - } Discussion, &c. of Observations.	*9 4 0	
E. G. Aldridge -	*7 6 8	
H. N. Cobley -	*8 8 0	
A. J. Rigby - }	*11 4 0	
	—— ——	89 9 3
Weather Information and Forecasts:		
Postmaster General, telegrams - - -	- -	161 14 4
F. Gaster - }	30 7 6	
W. L. Dallas - } Preparation, &c. of Weather Reports.	19 15 1	
F. Brodié - }	19 15 1	
H. W. Chivers }	*6 12 0	
	——	76 9 8
Ocean Meteorology:		
Capt. H. Toynbee - }	33 6 8	
R. Strachan - - } Discussion, &c. of observations and care of instruments.	27 15 6	
C. Harding - - }	22 4 5	
H. Harries - - }	*11 4 0	
Lieut. C. W. Baillie, R.N. }	16 13 4	
	——	111 3 1
Carried forward -	- -	£608 9 11

* Four weeks ending 27th August.

	£ s. d.	£ s. d
Brought forward -	- -	608 9 11
Miscellaneous :		
J. S. Harding, junr., petty cash - -	150 0 0	
„ „ - -	80 0 0	
		230 0 0
Total -	-	£838 9 11
Cheque drawn Sept. 4, for J. F. Hodgetts -	- -	12 12 0

The following cheques for September were drawn on the 31st of that month :—

Administration :	£ s. d.	£ s. d.
R. H. Scott, salary - - - -	- -	66 13 4
J. S. Harding, jun. }	27 15 6	
T. D. Bell - } Salaries and wages - -	13 6 8	
J. S. Harding, sen. }	*8 19 8	
		50 1 10
C. W. Jacques, rent, No. 116 - - -	133 13 0	
„ „ No. 113 - - -	18 0 6	
		151 13 6
H. Bond and Son, office repairs - -	- -	65 11 6
Pickford & Co., carriage of parcels - -	- -	0 17 6
Williams and Norgate, books - - -	- -	2 16 5
Special Researches :		
C. E. Burton, salary - - - -	- -	*8 8 0
R. W. Munro, alterations to Harmonic Analyser	- -	21 10 0
E. I. Strachan, Arctic work - - -	- -	2 5 0
W. Thomas, care of Scilly anemometer -	- -	2 11 8
H. Williams, care of " Bridled " anemometer -	- -	2 15 8
Land Meteorology :		
C. Niven, Aberdeen - - - -	- -	58 17 10
T. R. Robinson, Armagh - -	46 19 0	
„ „ (expenses) - -	9 7 2	
		56 6 2
W. L. Fox, Falmouth - - - -	- -	72 12 4
R. Grant, Glasgow - - - -	- -	68 8 4
H. Williams, Holyhead - - -	- -	2 15 10
G. M. Whipple, Kew - - - -	- -	100 0 0
C. Clouston, Orkney - - - -	- -	2 16 9
G. H. Aird, Seaham - - - -	- -	2 13 10
S. J. Perry, Stonyhurst - - -	- -	55 18 4
J. E. Cullum, Valencia - - -	16 13 4	
„ „ (expenses) - -	52 17 3	
		69 10 7
G. T. Watson, Yarmouth - - - -	- -	4 0 0
P. Adie, barometer (for Glasgow) - -	- -	12 0 0
T. Galvin (repairs at Valencia) -	- -	7 3 3
R. H. Curtis - }	22 4 5	
J. A. Curtis - }	15 11 1	
T. E. Allen - } Discussion, &c. of observations	15 11 1	
C. H. Thompson }	*9 4 0	
E. G. Aldridge - }	*7 6 8	
		69 17 3
Weather Information and Forecasts :		
J. W. Mayes, Ardrossan - - -	- -	2 1 6
Postmaster, Bundoran - - -	- -	1 6 0
H. Todd, Cambridge - - - -	- -	4 11 0
Carried forward -	- -	£966 3 5

* Four weeks ending 24th September.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	966	3	5
Weather Information and Forecasts—*cont.*						
Postmaster, Cliffony - - - -	-		-	0	19	6
H. Mohn, Christiania - - - -	-		-	5	10	0
J. Costello, Dover - - - -	-		-	3	18	6
W. Brand, Dunrossness - - -	-		-	2	0	6
Postmaster, Enniskillen - - -	-		-	0	19	6
W. Foster, Hawes Junction - - -	-		-	3	18	3
J. Tilston, Holyhead - - - -	-		-	3	19	0
G. G. Appleton, Hurst Castle - - -	-		-	4	4	6
Postmaster, Inverness - - - -	-		-	1	6	0
J. Fisher, Jersey - - - -	-		-	4	5	6
Postmaster, Killarney - - - -	-		-	0	19	6
F. Gaster, London - - - -	-		-	3	18	0
K. Kerr, Mullaghmore - - -	3	19	0			
W. Conway „ - - - -	5	17	7			
				9	16	7
W. D. Penny, Nairn - - - -	-		-	4	4	6
E. J. Lowe, Notts - - - -	-		-	3	18	0
W. Wickham, Oxford - - - -	-		-	3	13	4
G. Phillips, Parsonstown - - -	-		-	3	7	7
J. John, Prawle Point - - - -	-		-	3	5	0
G. Baker, St. Ann's Head - - -	-		-	4	5	9
J. Sibert, Spurn Point - - -	-		-	2	15	6
J. Sutherland, Stornoway - - -	-		-	4	2	2
J. Sinclair, Wick - - - -	-		-	3	5	0
J. Murray „ - - - -	-		-	1	6	0
G. T. Watson, Yarmouth - - -	-		-	4	4	6
A. Guy, York - - - - -	-		-	3	18	0
Postmaster General, telegrams - - -	178	3	4			
„ Valencia wire - - -	23	10	0			
				201	13	4
F. Gaster -	32	19	6			
W. L. Dallas -	18	1	1			
F. Brodie -	20	12	1			
H. W. Chivers -	6	12	0			
Preparation, &c. of Weather Reports.				78	4	8
Inspections:						
A. Buchan, salary - - - -	37	10	0			
„ expenses - - - -	39	10	2			
				77	0	2
W. C. Ley, salary - - - -	-		-	37	10	0
Ocean Meteorology:						
Captain H. Toynbee -	33	6	8			
R. Strachan - -	27	15	6			
C. Harding - -	22	4	5			
H. Harris - -	*11	4	0			
Nav. Lieut. C. W. Baillie, R.N.	16	13	4			
Discussion, &c. of observations, and care of instruments.				111	3	11
P. Adie, repairing "A" barometers - -	18	18	6			
„ „ "B. T." „ - -	16	16	6			
				35	15	0
Peninsular and Oriental Steam Navigation Company, freight -				1	3	6
T. Skinner and Co., freight - - -	-		-	1	5	9
H. Harries, index of logs - - -	-		-	3	12	0
J. E. Harries, „ - - -	-		-	4	0	6
J. H. Woodstock, packing cases - -	-		-	2	12	6
Carried forward -			-	£1,608	5	5

* Four weeks ending 24th September.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	1,608	5	5
Miscellaneous:						
P. Adie, commissions - - - -	-		-	13	10	0
Chance, Brothers, & Co., commissions -	-		-	3	15	0
R. J. Lecky, commissions - - -	-		-	3	9	6
G. M. Whipple, „ - - -	-		-	20	0	0
J. S. Harding, jun., petty cash - -	75	0	0			
„ „ - - -	75	0	0			
				150	0	0
Total - -				£1,798	19	11

116, *Victoria Street, November* 11, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (October 28) were read and confirmed.

The Chairman reported that on the 8th instant he had had an interview at the Treasury with Lord F. Cavendish and Sir R. Lingen, and had been informed by them that a letter would be addressed by the Treasury to the President and Council of the Royal Society, with reference to the approaching close of the period for which the Office was placed under its present management.

Submitted—The following statements of work done in the various departments of the Office from July 1877, to October 1881, together with a memorandum by the Chairman relating to them:—

STATEMENTS of WORK done in the VARIOUS DEPARTMENTS of the METEOROLOGICAL OFFICE from July 1877 to October 1881.

I.—MARINE DEPARTMENT.
II.—WEATHER TELEGRAPHY.
III.—LAND METEOROLOGY.
IV.—PANTAGRAPH ROOM.

I.—STATEMENT of WORK done in the MARINE DEPARTMENT from June 1877 to October 1881.

(1.) Completion of the discussion of the weather in the North Atlantic during August 1873.

This work was ordered to be undertaken by the Committee in December 1873. It was carried on at spare time by two of the staff; it was finished in June 1878, and published under the title "Meteorology of the North Atlantic during August 1873, illustrating the Hurricane of that Month. With an atlas of 32 charts."

The atlas contains daily charts for the month, showing the direction and force of wind, and the barometric and thermometric readings from about 120 to 150 ships logs for 0h. 43m. Greenwich mean time, with land observations for the same epoch. It is accompanied by about 200 pages of explanatory letterpress.

(2.) The discussion of the meteorology of the ocean district adjacent to the Cape of Good Hope.

This discussion was taken up by various clerks (as opportunity offered) during 1876, but it was not fairly in hand by the entire staff of the Marine Room until June 1877, and even then it was frequently interrupted by work connected with No. (1).

The results of the discussion are now in the press. The atlas will contain monthly charts: A., of winds, with the temperature and pressure of the air; B., of the surface temperature and the currents of the sea; C., annual charts, summarizing series A. and B. respectively; D., quarterly charts, giving the specific gravity of the sea, the frequency of ice, and passage diagrams.

The letterpress will contain an explanation of the charts, with Appendices giving the data for wind, weather, &c., extracted from the logs.

(3.) Report on the gales of the neighbourhood of the Cape of Good Hope.

This discussion has been entrusted to Captain Toynbee, who has worked at it, at spare hours, since January 1879. The clerical work connected with the extraction of data from the logs, &c. has been done in the Marine Room. The Report will probably be published in the spring of 1882.

(4.) The sea surface temperature and current charts for the oceans of the globe, for the months of February, May, August, and November.

This work was commenced by one of the staff of the Marine Room in March 1879; in October of that year it was entrusted to Mr. Baillie, with one assistant. During the last two or three months additional assistance has been given.

The temperature charts for the Pacific and Indian Oceans are completed, and those for the Atlantic, as far as the materials in the Office are concerned, will probably be finished by January 1882.

The observations on currents for the Pacific for the four months have been extracted from the logs. They could probably be discussed and entered on charts in about six months' clear work by Mr. Baillie, unassisted.

The current observations for the other oceans have not as yet been extracted.

(5.) The collection of data for the Indian Government.

All the marine observations in the Office for the area from the Equator up to the coast of Asia, and from 50° to 100° E. long. (the Arabian Sea and Bay of Bengal) for 11 months of the year were extracted into data books; a duplicate copy being kept by the Office. (The month of January had been done previously.)

This work was executed at the expense of the India Office. It was commenced in March 1879, and completed in September 1880. It was done by outside assistance, with the exception of about six months of one person's time.

(6.) The collection of data for the Bureau Central Météorologique, Paris.

A copy of all the observations in the Office for the western part of the North Atlantic for the months of July, August, and September in the years 1856–1878 was supplied.

This work was executed at the expense of the French authorities; it occupied six weeks, was completed in April 1879, and was done by outside assistance.

(7.) The supply of data to Captain Hoffmeyer for his synoptic charts of the North Atlantic.

This work, which had been current for about five years, was completed in December 1878. It was done at extra hours.

(8.) The continuous supply to the American Government of marine observations in the North Atlantic for the production of synoptic charts.

This work is current; it is executed at the expense of the Chief Signal Office, Washington, and is done at extra hours.

(9.) The examination of the sea surface temperature in Square 3 for the months of January and July in the years 1855 to 1871 separately, in order to discover if any periodical change was traceable.

This work occupied about a week of one person's time. It was completed in March 1881.

(10.) The regular routine work of the room consists principally in—

(1.) The examination of all logs and lighthouse registers received at the Office.

This occupies about one-third of one person's time.

(2.) The keeping of a record of the amount and position of all data, as the logs are received at the Office.

This occupies about one month of a boy's time per year.

HENRY TOYNBEE,
Marine Superintendent.

November 3, 1881.

II.—STATEMENT of WORK done in the DEPARTMENT of WEATHER TELEGRAPHY from June 1877 to October 1881.

Meteorological Office, Telegraph Branch,
November 4th, 1881.

In the course of the past five years the following special work has been carried on in this branch, in addition to the ordinary routine work of preparing and issuing the Daily and Weekly Weather Reports, Forecasts, Storm Warnings, &c., with the checking of the two last.

1. *The Quarterly Weather Report.*

The Volume for 1875 (Old Series) Parts I. to IV. have been prepared and published.
" 1876 (New Series) Part I.* prepared and printed.
" 1879 (") Part I. is more than half finished.

The tables for Part II. in 1876 and most of those for Part II. in 1879 are prepared.

2. The calculation of the following tables, which were published as Appendix VII. of the Quarterly Weather Report, 1875:—

A. The Mean Monthly and Annual Tables of Rainfall and Barometrical Pressure for the 10 years, 1866–75, for 12 telegraphic reporting stations, and for the 5 years, 1871–75, at 15 and 13 stations respectively.

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* The preparation of the Quarterly Weather Report, Part I., 1876, occupied many months, the plan of the whole work having been, after careful consideration, entirely re-cast. Part I., 1879, is being pushed forward much more rapidly.

B. The Mean Monthly and Annual Tables of Temperature, with the means of the maximum and minimum readings, and the extremes observed in each month, with dates, for the 5 years, 1871–75, at 21 stations, and for the 3 years, 1873–75, at 2 stations.

3. The calculation of annual, monthly, and weekly rainfall for the 10 years, 1866 to 1875, at 47 stations, and the extraction of monthly mean temperatures (from Mr. Buchan's charts) for 73 stations. All these values have been plotted on diagrams, and the corresponding curves drawn. They are not published, but are employed in the preparation of the Weekly Weather Report.

4. The calculation of the monthly and annual means of rainfall at 50 stations, and of temperature at 61 stations for the 12 years, 1866–77. These were grouped into 11 districts, and the mean for each district was obtained. The values are published regularly in the Quarterly Summary of the Weekly Weather Report.

5. The examination of the "New York Herald" warnings for the two years, 1877–78. The results of this inquiry have not been published by the Office. Mr. Scott published a paper giving the figures for 1877 in the "Nautical Magazine" for March 1878.

6. The examination of the Hay Harvest Forecasts for the 3 years, 1879–81.

This work was undertaken in 1879, and has been continued annually till the present time, as a test of the value of the daily forecasts to agriculturists. The results are published at length in the Minutes, and in an abbreviated form in the Annual Reports of the Council. The observations by which they are checked are furnished by gentlemen immediately engaged in agriculture, and are accompanied by some very satisfactory testimonials to the value of the work.

7. The preparation of a system for reporting movements of clouds of the cirrus type, and the partial discussion of the observations.

This series of observations is purely experimental, but promises to prove of great value as an assistance in the work of issuing Forecasts and Storm Warnings. Some modifications of the present system will probably be required before the work is permanently established, but these modifications have not yet been decided on, the discussion of the materials being incomplete.

8. The following discussions have been commenced, but are at present suspended, owing to want of hands to carry them on:—

A. The calculation of the mean barometric pressure for winds from each alternate point of the compass at 21 telegraphic reporting stations for the 5 years, 1866–70.

B. An investigation into the mean amount of cloud prevalent at 5 telegraphic reporting stations. The results for the 6 years, 1869–74, were completed, but were not considered to be good enough to be published at present. The work will probably be added to and published at some future date.

R. H. Scott, Esq. FREDC. GASTER.

III.—STATEMENT of WORK done in the DEPARTMENT of LAND METEOROLOGY from June 1st, 1877, to October 1881.

Meteorological Office, November 14th, 1881.

Staff.

One member of the staff resigned in November 1879 and his place was not supplied for 18 months, although temporary assistance (in copying) was obtained for three months in 1880.

Discussion of Results from the Seven Self-Recording Observatories.

The daily and five-daily means of the barometer and dry-bulb and wet-bulb thermometers have been obtained for all the stations for the months January 1877 to December 1880, except those for six of the stations for the year 1878.

The annual tables, including the monthly means and the conversion of the values into French measures, have been prepared or partially prepared for the five years 1876, 1877, 1878, 1879, and 1880, about three-fifths of the whole amount of the work having been done. About one month would be required for completion.

The sheets showing the daily maxima and minima of pressure and temperature have been prepared for the three years 1877, 1878, 1879, and the values checked from the tabulations. The absolute maximum and minimum of each month, however, require checking from the curves by independent measurement. For the year 1880 two-sevenths of the sheets are also prepared.

The vapour tension for each hour at each observatory has been calculated by Glaisher's tables from the readings of the dry-bulb and wet-bulb thermometers, up to December 31, 1880.

The "Hourly Readings" have been copied for the four years, 1877, 1878, 1879, and 1880, and have been published as far July 1880. The latest month of which the tabulations are ready to be copied is April 1881. These readings were six months in arrear in July 1877.

Quarterly Report for the Registrar-General for Ireland.

This report has been regularly and punctually furnished to the Registrar-General. It originally comprised observations at only five stations, but that number has now been increased to seven.

Returns from Stations of the Second Order.

On June 1st, 1877, 40 pages of the volume for 1876 were in the hands of the printers. Since then the volume of that year has been completed by the addition of 75 pages; the volume for 1877, extending to 165 pages, has been issued, and also that for 1878, comprising 177 pages of printed

matter. In addition 80 pages of the volume for 1879 are in print. This will be slightly thicker than the volume for 1878.

Besides the issue of the yearly volumes much work has been done in educating the observers, and in extending and perfecting the system. Many returns, especially those from new stations, have been carefully examined and compared, their errors and defects pointed out, and instructions given as to the methods to be followed in the future.

Tabulation of Anemograms.

Anemographic curves are regularly received from six stations, and these are tabulated in the department.

The work is complete as far as the end of 1880, but the sheets for 1881 are not yet far advanced.

In addition to the various branches of work enumerated above, considerable time in all has been spent on sundry smaller matters, such as the annual summary of rainfall prepared for Mr. Symons, the care of returns from foreign land stations, reports for legal and other purposes for which payment has been made, &c. It is difficult to estimate exactly the time so occupied, but it certainly is not less than one third of one person's whole time.

JOHN A. CURTIS.

To R. H. Scott, Esq., F.R.S., &c.

IV.—STATEMENT of WORK done in the PANTAGRAPH ROOM from July 1877 to October 1881.

November 3, 1881.

Quarterly Weather Report.—The curve plates for the last three months of the year 1875 and for the whole of the years 1876, 1879, and 1880 have been engraved, and could be printed off within six months. The year 1877 is now in hand; 1878 is untouched, and 1881 will not be begun until further instructions are received from the Council.

Comparison of the Kew and Greenwich Curves.—The Greenwich barograph, thermograph, and wind and rain curves for the year 1875 were reproduced, and the vapour tension curves worked and engraved on 25 copper plates along with the corresponding curves for Kew.

This work is estimated to have occupied nearly eight months. Several questions which arose respecting the Greenwich curves involved the expenditure of a large amount of time, as did also the subsequent discussion of the results of the comparison.

"Index" Plates.—The Kew curves for 1875 were also engraved on two copper plates on a very reduced scale. The scale plates for these were also engraved in the Office.

Scale Plates.—Two six-day plates for use in the leap-years 1876 and 1880 have been divided and engraved, the whole of the work being done in the Office.

Chart Plates.—The plates for six months—ten in number—have been engraved. The original plate of outline charts was also prepared in the Office.

Electrograms.—A considerable amount of time was occupied in pantagraphing the Kew electrograms for 1875, and also in reducing a number of electrograms for Professor Everett's paper. This was mainly experimental work. A few were engraved on copper, but many more on zinc plates.

Harmonic Analyser.—A large amount of time has been occupied by this instrument, chiefly in preliminary and trial work. The temperature results for 1871 have been obtained by Mr. Burton, and those for 1872 are about two-thirds done.

Glass Tabulating Scales.—Two thermogram scales have been made, and several smaller scales for use in the Office, &c.

Scale Values.—New scale values have been found for the barographs of the seven observatories. The thermogram zero-line values have been checked and re-determined as necessary. The barogram scales occupied all the staff for several weeks.

Several smaller matters, such as the preparation of templates for the pantagraph, and of plates for the Marine Room, experiments with plates from Van Rysselberghe's Meteorograph, &c., &c., have in the aggregate occupied a large amount of time.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

MEMORANDUM BY THE CHAIRMAN.

A.

REMARKS on the FOREGOING STATEMENTS.

I.—MARINE DEPARTMENT.

It may be assumed that by the close of the present year the Marine Department will have completed the two pieces of work on which it is at present engaged: (viz., the discussion of the Cape District, including a special consideration of the gales of that region, and the preparation of charts of sea surface temperature for the oceans of the globe). As regards the discussion of ocean currents considerable progress has been made with those of the Pacific; no order has been

given by the Council with regard to the currents of the other oceans. The past work being thus in the main, disposed of, the only questions to be now considered relate to the future work of the department.

The Council have already resolved that the observations of the barometer be charted in the same manner as the sea surface temperatures; but it has been hitherto left undecided whether the whole staff of the Marine Room should be employed in the discussion of the barometer observations, or whether some other piece of work might not be taken up concurrently with it.

If the latter alternative should be adopted, the following suggestions (which have been made at various times) would have to be considered:

(i.) That some ocean district, important for seamen, or for the meteorology of the globe, should be selected for special study (*e.g.*, the belt surrounding the Antarctic regions, and including the tracks from the Cape of Good Hope and Cape Horn to Australia and New Zealand. [This latter inquiry was selected by the Council in 1878 as the next piece of marine work to be undertaken after the discussion of the Cape District. (Minutes, 1878, p. 106.)]

(ii.) That some other meteorological element (*e.g.*, the air temperature,* or the winds) should be discussed at the same time with the barometer for the oceans of the globe.

(iii.) That a synoptic study of the weather of the North Atlantic be undertaken for a definite period of time, say for the twelve months beginning at Midsummer 1882, with the special object of acquiring some knowledge of the history of the systems of weather which arrive from the west on the coast of the British Isles.

The charting of sea surface temperatures has been conducted with great regard to economy of time; and although the discussion of the Cape District has been protracted over a very long period, the delay is attributable, not to want of activity on the part of the Department, but partly to tentative changes of plan in the earlier stages of the work, and partly to the great amount and variety of material to be dealt with.

II.—Weather Telegraphy.

It appears from the Report on this Department that, while the daily work of the Department (the preparation and issue of forecasts and warnings, and of the Daily and Weekly Weather Reports) has been carried on with great punctuality, the preparation of the text of the Quarterly Weather Report has seriously fallen into arrears. This Report was already behindhand when the Council took charge of the Office, and during the past four years only six (instead of sixteen) quarterly parts have been prepared. No doubt a very considerable amount of time was expended in settling the future form of the Report after the completion of the volume for 1875, in December 1878; but the temporary delay this occasioned by no means accounts for the whole of the backwardness of the work.

It it is difficult to avoid the conclusion that the Department is at present overweighted, and that it ought to receive some increase of force. This impression is confirmed by a glance at the conditions under which the forecasting and the preparation of the Daily Weather Report are now carried on. It is difficult to see how the forecasting can be improved, except by making every serious mistake that may occur the subject of a careful and immediate examination. But for this there is at present no sufficient time, and the clerks have to hurry on to the preparation of the next forecast, without having leisure to profit fully by their recently acquired experience. There is, in fact, a perceptible danger that (if the present state of things continues) the whole process of forecasting may become somewhat mechanical and lifeless, instead of growing and improving, as it ought to do.

Two other closely connected points may be mentioned which show that the Department is overworked: —

(1.) A considerable portion of the Quarterly Weather Report (*e.g.*, the tables of cyclonic and anti-cyclonic systems) ought to be prepared almost contemporaneously with (say within two or three days of the occurrence of) the phenomena. But as yet this is not attempted; and the Quarterly Report is constructed from long gone by records and charts, at a time when the weather phenomena to be described have entirely passed out of mind.

(2) As the Council has lately had occasion to observe, the most remarkable system of weather may pass over the British Isles without getting properly studied as a whole. An account of it has indeed to be written each day for the Daily Weather Report, but when it has passed away no complete record of its history from beginning to end can be produced until the time for writing the Quarterly Report arrives.

It is only just to say that it does not appear that any blame can be attached to the clerks employed in the Department. They are wanting neither in zeal nor in ability, and they work for many hours in the day. It must be remembered that the issue of a Weekly Weather Report (involving much tentative and preparatory work) has commenced within four years, and that the system of forecasting has been also introduced by the present Council, and that, even before its introduction, the work of the Department had already begun to fall into arrear.

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* It may be mentioned that of the elements recommended to be observed by the Brussels Conference, and contained in the meteorological log, the readings of the wet bulb thermometer have not been discussed for the Cape District.

Two changes may be mentioned which might help to remedy the present evils :—

(1.) The organization, under the immediate supervision of the Council, or a committee of it, of an efficient system of criticism of the forecasts.

(2.) The addition of another clerk to the Department, qualified not merely to discharge its routine duties, but to take part in some of its higher scientific work.

III.—Land Meteorology.

The work relating to the seven observatories, viz., the preparation of the daily and five-daily means, and of the annual tables, has been fairly well kept up. The preparation for publication of the hourly readings is, however, nearly a year behindhand, but the amount of the arrears has not considerably increased during the last four years.

On the other hand, the returns from the Stations of the Second Order, being in fact the climatological returns for the United Kingdom, seem at the present time to be falling into arrear ; only three volumes having been produced, whereas four ought to have come out in the four years since June 1877.

As the Department was underhanded during the greater part of the time, the state of the work need not give rise to any serious uneasiness. The number of Stations of the Second Order, and the reduction to be made in connexion with them, increased rapidly in 1877 and 1878, but a little occasional addition to the computing force of the room would probably enable the clerks to get abreast of the work again.

No further discussion of the curves or tabulations has been attempted, as it is hoped that the need for such computations will be superseded by the Harmonic Analyser. As, however, it is not proposed to employ the Analyser for the anemograms, it might be well to attempt some systematic arithmetical discussion of these records.

IV.—The Pantagraph Room.

In this room it may fairly be said that the arrears in the regular work are only apparent, and due to the incidental duties (especially the comparison of the Kew and Greenwich curves) undertaken by the staff. So far as the capacity for turning out work is concerned there is no reason why the engraving of the curve plates for the Quarterly Weather Report should not be continued as heretofore ; at least if the preparation of the chart plates which have been introduced for the first time into Part I. of the Report for 1876 be not thrown on the room.

The Council have, however, frequently expressed the opinion that the time would soon arrive when the present plan of engraving the whole of the continuous records from the observatories ought to undergo some revision.

B.

Statement showing the Probable Position on March 31st, 1881, of Various Branches of Work undertaken by the Office.

The following brief statement is intended to present a view of what may be expected to be the position of the Office on the 31st March 1882, with regard to work actually done or undertaken during the last four years :—

I.—Publications.

(a) *Occasional.*

(1.) Aids to the Study and Forecasts of Weather.
[Published already.]

(2.) Charts of the Cape District, and accompanying Letterpress.
[Will probably be published.]

(3.) Charts of Sea Temperature for the Oceans of the Globe.
[Will be ready for publication, if not actually published.]

(3*.) Discussion of Cape Gales.
[As No. 3.]

(4.) Meteorological Charts of the British Isles.
[As No. 3.]

(5.) Tables of Rainfall of the British Isles.
[Will probably be published.]

(6.) Contributions to our Knowledge of the Arctic Regions.
[Parts I. and II. already published ; Part III. in preparation. (See note.)]

(7.) Meteorology of Kerguelen Island.
[Already published.]

(b) *Periodical.*

(1.) The Daily Weather Report.
[The Charts in an altered form since 1st January 1881.]

(2.) The Weekly Weather Report.
[Commenced February 11, 1878.]

(3.) The Quarterly Weather Report.
[Very much in arrear, only six Parts at most having been produced in four years, instead of 16.]

(4.) The Hourly Values from the Seven Observatories.
[One year in arrear, partly owing to delay at the lithographers.]
(5.) Returns from Stations of the Second Order.
[Two years in arrear.]

II.—Miscellaneous Investigations and Discussions.

(1.) Comparison of the Kew and Greenwich Curves.
[Completed, and published in the Quarterly Weather Report for 1876.]
(2.) Observations of Sea Temperature round the British Isles.
[In progress; the results of the first two years to be given in the Meteorological Charts of the British Isles.]
(3.) Records of Bright Sunshine.
[The system was introduced early in 1880; the results are partially published in the Weekly Weather Report.]
(4.) Employment of the Harmonic Analyser for the Discussion of Meteorological Curves.
[The preliminary trials have been completed, and the instrument is in actual use; no results have as yet been published.]
(5.) Erection of a Bridled Anemometer at Holyhead.
[The instrument still requires some slight further modifications.]
(6.) Photographic Observations for determining the Height, Direction of Motion, and Velocity of Clouds.
[The observations are still in the experimental stage.]

Note.—The attempts of the Council to obtain a satisfactory series of typical photographs or drawings of cloud forms have not as yet been successful.

(7.) Reflecting Nephoscope.
[Entrusted for experimental use to Dr. Propert, at St. David's.]
(8.) Experiments at Kew on the Exposure of Thermometers.
[Have been conducted for two years by Mr. Whipple.]
(9.) Experiments on Hygrometry and Evaporation.
[In progress; Mr. Shaw.]
(10.) Investigation of London Fog.
[In progress; Prof. Frankland, Prof. Abel, and Dr. Russell.]
(11.) Discussion of the Kew Electrograms.
[In progress; Mr. Whipple.]
(12.) Experiments to determine the direction of Upper Air Currents by means of Explosive Shells.
[The preparations for the experiments are in progress; Captain Noble.]
(12.) Balloon Observations.
[Four ascents already made since July 1881. The observations not yet discussed.]

Note.—As the computations and discussion of Arctic data have progressed it has become apparent that the material is too extensive for Part III. of Contributions to Arctic Meteorology, and that it will be better to divide it into two Parts, each of which would be smaller than Part II.

In Part III. I would suggest that the following stations should be comprised:—

Station.	State of Discussion.
1. Winter Harbour	In progress.
2. Igloolik	Finished.
3. Winter Island	Ditto.
4. Port Bowen	Not touched.
5. Port Leopold	In progress.
6. Wolstenholm Sound	Ditto.
7. Drift of "Advance"	Not touched.
8. Walker Bay	Finished.
9. Cambridge Bay	Ditto.
10. Camden Bay	Ditto.
11. Fort Simpson	Ditto.

There would then remain for Part IV.:—

12. Princess Royal Islands	Some data copied.
13. Mercy Bay	Ditto.
14. Dealy Island	In progress.
15. Melville Sound	Ditto.
16. Beechey Island	Ditto.
17. Rensselaer Harbour	Not touched.
18. Port Foulke	Finished.
19. Thank God Bay	Not touched.
20. Life Boat Cove	Ditto.
21. Floeberg Beach	Ditto.
22. Lady Franklin Sound	Ditto.

If this suggestion is approved, Part III. could be got ready for the printer by March next.

R. Strachan,
November 7th, 1881.

Resolved—I. That the Secretary report on the state of forwardness of the plates and tables for the Quarterly Weather Report (including two years of the Chart Plates), with the view of publishing the plates separately from the letterpress.

II. That the Chairman and Mr. Galton be appointed a Committee to consider the periodical publications of the Office.

III. That the tables No. 9 in the Report of the Marine Room and the papers relating to the "New York Herald" warnings be submitted to the Council.

Captain Templer attended, and it was agreed that he should continue the series of balloon ascents undertaken at the request of the Council (Minutes, p. 54).

Mr. Scott stated that he had ascertained (Letters 1884 and 1904) that a Thomson's portable electrometer could be obtained from Mr. White, of Glasgow, for 12*l*. 12*s*.

He was instructed to purchase the instrument, with a view to its being used in the balloon ascents.

With reference to Mr. Whipple's report on the defects of the anemometer supplied to the Radcliffe Observatory, Oxford (Minutes, p. 54), the Chairman was requested to communicate with Mr. Stone on the subject of these defects, and to ascertain whether they could be easily removed.

The Chairman reported that he had, with the Secretary, revised the lists of persons and institutions receiving free copies of the publications of the Office, and had made certain reductions in these lists.

The Secretary asked for instructions as to the number of copies to be printed of the Cape Charts and accompanying letterpress.

He was directed to order 500 copies.

Read—The following letter:—

No. 181,445.—M.O. 1954.

General Post Office, London,
November 10, 1881.

SIR,

I BEG leave to inform you that it would be of advantage to the superintending engineers of this department if they could be supplied with copies of the Weather Forecast telegrams and Storm Warning reports issued by the Meteorological Office, and I shall be glad to know whether you have any objection to the contents of the telegrams in question being supplied to them.

I am, &c.

The Secretary, Meteorological Office. (Signed) J. C. LAMB.

The Secretary was instructed to reply (Letter 2141) that the Council are very glad to be able to facilitate in any way the operations of the superintending engineers of the the Post Office, and that any telegrams forwarded by the Meteorological Office may be used by the Postmaster General for the public service.

Read—A memorandum from Captain Toynbee reporting that since the last meeting four logs had been received, two of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Barron -	S.S. "Sultan" -	June 21—Oct. 18, 1881.	Hamburg and Hull, eight voyages.	1881, p. 35.
Capt. W. Randall -	S.S. "Iron Cross"	Feb. 17—Nov 1, 1881.	Liverpool, Rangoon, and home.	1880, p. 116.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Read—A letter (No. 1964) from Mr. C. E. Burton, stating that he should be obliged to resign his clerkship as soon as cold weather should set in.

Submitted—The Quarterly Weather Report, 1876, Part I.

Reported that the cash accounts for the nine months ended 30th June 1881 were audited by the Chairman and General Strachey on the 10th instant, and would be sent at once to the Treasury for the Audit Office. The receipts for the nine months, exclusive of a balance of 1,618*l*. 16*s*. 10*d*. on the 1st October 1880, amounted to 13,030*l*. The payments amounted to 12,459*l*. 3*s*. 6*d*., leaving a balance of 2,189*l*. 13*s*. 4*d*. in hand and at the Bank on the 1st July 1881.

The following cheques for October were drawn on the 31st of that month:—

	£ s. d.	£ s. d.
Administration:		
R. H. Scott, salary	-	66 13 4
J. S. Harding, jun. } Salaries and wages	27 15 6	
T. D. Bell }	13 6 8	
J. S. Harding, sen. }	*11 4 7	
		52 6 9
Gas Light and Coke Company, gas	-	1 4 8
Atkinson & Co., linoleum	-	8 9 6
R. Mustart, indexing Minutes	-	2 12 6
Pickford & Co., carriage of parcels	-	2 7 2
Special Researches:		
C. E. Burton, salary	-	*10 10 0
T. De La Rue & Co., sun cards	-	8 15 0
E. I. Strachan, Arctic work	-	2 15 6
Land Meteorology:		
R. & J. Beck, zinc plates, &c.	-	34 13 9
J. E. Cullum, salary	-	16 13 4
Hopkin & Williams, chemicals	-	5 2 6
W. Marriott, meteorological returns	-	25 0 0
G. M. Whipple, waxed paper	-	10 0 0
R. H. Curtis } Discussion, &c. of Observations.	22 4 5	
J. A. Curtis }	15 11 1	
T. E. Allen }	15 11 1	
C. H. Thompson }	*11 10 0	
E. G. Aldridge }	*9 3 4	
		73 19 11
Weather Information and Forecasts:		
Postmaster General, telegrams	-	171 1 4
F. Dangerfield, delivery of D.W. charts	-	11 13 4
W. Morrison, Stornoway	-	1 6 0
J. Sutherland, do.	-	5 11 6
W. Thomas, Scilly	-	4 18 7
W. Wightman, B. P. wrappers	-	7 0 0
F. Gaster } Preparation, &c. of Weather Reports.	30 7 6	
W. L. Dallas }	20 12 1	
F. Brodie }	21 9 1	
H. Chivers }	*8 5 0	
		80 13 8
Inspections:		
W. C. Ley, expenses	-	14 12 2
G. M. Whipple „	-	42 14 3
Ocean Meteorology:		
Captain H. Toynbee } Discussion, &c. of observations, and care of instruments.	33 6 8	
R. Strachan }	27 15 6	
C. Harding }	22 4 5	
H. Harries }	*14 0 0	
Nav. Lieut. C. W. Baillie, R.N. }	16 13 4	
		113 19 11
G. M. Whipple, verifying "A" Instruments	10 10 0	
„ „ "B" „	5 0 0	
		15 10 0
J. R. Jones, Aberdeen agent	-	5 2 9
P. A. Feathers, Dundee agent	-	1 5 0
D. McGregor & Co., Glasgow agents	-	3 5 0
J. Gill, Liverpool agent	-	7 7 1
C. H. Permain, Southampton agent	-	8 9 0
Nautical Magazine, advertisements	-	1 2 6
P. Riddle, Bermuda	-	4 12 0
Carried forward	-	£821 8 0

* Five weeks to the 29th October.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	821	8	0
Miscellaneous:						
Bates, Gildea, and Walker, trays - -	-		-	8	4	6
L. P. Casella, "Deep-sea" Thermometer -	-		-	2	10	0
T. De La Rue & Co., sun cards, bought on commission			-	4	3	0
G. M. Whipple, verifications - - -	-		-	2	7	0
J. S. Harding, jun., petty cash - -	120	0	0			
,, ,, - -	80	0	0			
				200	0	0
				£1,038	12	6

116, *Victoria Street, November* 25, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. GALTON. | LIEUT.-GENERAL STRACHEY.
PROFESSOR STOKES. | THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (November 11) were read and confirmed.

Read—The following letter:—

M.O. 2026.

DEAR SIR, The Royal Society, Burlington House, November 17, 1881.

WITH reference to the Treasury letter on the subject of the future arrangements for the Meteorological Council, of which I enclose a copy, I feel sure that the Council of the Royal Society would like to have the advice of yourself and your Council before sending any answer.

Will you therefore kindly consider the subject, and let us have any suggestions that you would like to make, at your early convenience? I will then lay them, as well as the Treasury letter, before the Council of the Royal Society.

I am, &c.

Prof. H. J. S. Smith, F.R.S., Chairman of the Meteorological Council.

(Signed) W. SPOTTISWOODE, President R.S.

18,128/81.

SIR, Treasury Chambers, November 10, 1881.

WITH reference to Professor Huxley's letter of the 1st instant, transmitting a copy of the Report of the Meteorological Council for the year ended the 31st of March last, I am directed by the Lords Commissioners of Her Majesty's Treasury to acquaint you that copies of this Report will be laid before both Houses of Parliament, by command of Her Majesty.

With reference to the statement that the arrangement made in the letter from this Board of the 23rd of May 1877 will terminate with the present financial year, I am to inquire whether the President and Council of the Royal Society wish to recommend any change in that arrangement.

If so, it will be desirable that the recommendations of the Society should be transmitted to this Board as soon as they conveniently can be, so that they may be considered in connexion with the preparation of the Estimates for 1882–3.

I have, &c.

The President of the Royal Society, Burlington House.

(Signed) F. CAVENDISH.

The Chairman was requested to prepare a draft reply to the preceding letter.

Read—The following letters:—

M.O. 2049. 19046/81.

SIR, Treasury Chambers, November 22, 1881.

I AM directed by the Lords Commissioners of Her Majesty's Treasury to transmit to you herewith (in original, to be returned), a letter from the Foreign Office, dated the 17th instant, with its enclosures, relating to a proposal for the establishment of a circumpolar chain of stations for meteorological and magnetic observations, and I am to request that in laying these papers before the Meteorological Council you will move them to favour My Lords with a report upon the following points, viz.:

(1.) The importance of the object.
(2.) The probability of success.
(3.) The probable cost, and whether it will be in its nature permanent, like the costs of the observatories at Greenwich or the Cape of Good Hope.

I have, &c.

The Secretary, Meteorological Council.

(Signed) R. R. W. LINDEN.

SIR, Foreign Office, November 17, 1881.

I AM directed by Earl Granville to transmit to you, to be laid before the Lords Commissioners of the Treasury, for any observations they may have to offer thereon, the accompanying correspondence relative to a proposal which was brought to his Lordship's notice in April last by the Russian Ambassador for the establishment of a circumpolar chain of stations for meteorological and magnetic observations. Their Lordships will perceive that on the recommendation of the Meteorological Council, the Government of Canada have been consulted on the subject, and have expressed their willingness to assist Her Majesty's Government in any way, if it is decided to establish an Arctic Station in British North America, but that they cannot undertake to defray the expense it would entail.

The German Chargé d'Affaires, on behalf of his Government, has now inquired whether Great Britain or Canada intend to participate in the proposed scheme, and Lord Granville will be glad to be favoured with any observations which the Lords of the Treasury may have to offer on the subject.

I am, &c.

The Secretary to the Treasury. (Signed) TENTERDEN.

SIR, Downing Street, September 26, 1881.

I AM directed by the Earl of Kimberley to acquaint you that a copy of your letter of the 10th of June, with its enclosures, respecting the establishment of a circumpolar chain of meteorological and magnetic observations, was forwarded for the consideration of the Canadian Government, and I am to transmit to you, for the information of Earl Granville, a copy of a despatch* with its enclosure, which has been received from the Deputy Governor of the Dominion in reply.

I am, &c.

The Under Secretary of State, (Signed) JOHN BRAMSTON.
Foreign Office.

DEPUTY-GOVERNOR RITCHIE to the EARL OF KIMBERLEY.

No. 43.

MY LORD, Canada, Ottawa, September 3, 1881.

I HAVE the honour to forward herewith, for the information of the Foreign Office, a certified copy of a report of a Committee of the Privy Council,† in which is embodied a report by the Minister of Marine and Fisheries, expressing the views of my Government with respect to the establishment and maintenance of a circumpolar chain of meteorological and magnetic observations in British North America, the consideration of which formed the subject of your Lordship's despatch and of the enclosures No. 167 of the 16th June last.

I have, &c.

The Right Hon. The Earl of Kimberley, (Signed) W. J. RITCHIE,
&c. &c. &c. Deputy Governor.

COPY of a REPORT of a COMMITTEE of the Honourable the PRIVY COUNCIL for CANADA, approved by the Honourable the DEPUTY of His Excellency the GOVERNOR-GENERAL on the 29th day of August 1881.

THE Committee of Council have had under consideration a despatch from the Right Honourable the Secretary of State for the Colonies, No. 167 of the 16th June last, transmitting a copy of a letter from the Foreign Office, enclosing a correspondence relative to a proposal originating with the Russian Government for the establishment of a circumpolar chain of meteorological and magnetic observations, the letter from the Foreign Office calling attention to the suggestion of the Meteorological Society as to the establishment of a station of observation in British North America.

The Honourable the Minister of Marine and Fisheries, to whom said despatch with enclosure† has been referred, recommends that the Secretary of State for the Colonies be informed that the Canadian Government will be happy to assist the British Government in any way, should the latter Government wish to establish and maintain a circumpolar chain of meteorological and magnetic observations in British North America, but that the Canadian Government cannot undertake to defray the expense of such an establishment.

The Committee concur in the foregoing recommendation and submit the same for approval.

Certified, J. C. COTE.
(Signed) Clerk Privy Council, Canada.

Read—A letter (No. 2006) from the Board of Trade, asking for any opinion which it may be in the power of the Council to give, as regards the value of the objects of the Balloon Society, which has applied to the Board for a license for registration under the Companies Act, 1867.

The Secretary was instructed to reply (Letter 2246) that the information which the Meteorological Council possess as to the Balloon Society is not such as to enable them to make any recommendation on the subject.

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* No. 43, 3rd September.

† 18th August 1881.

Submitted—The following :—

REPORT of the COMMITTEE [CHAIRMAN and MR. GALTON] appointed to consider the PERIODICAL PUBLICATIONS of the OFFICE.

The Committee recommend—

1. *Hourly Values.*—That the hourly values of the Self-recording Observatories be printed in the same form as the Quarterly Weather Report, instead of being lithographed as hitherto : the new form of publication to begin with the hourly values for 1881.

2. *Stations of Second Order.*—That the publication of the returns from Stations of the Second Order be continued as at present; but that a map be added showing the distribution of the stations, and giving such additional information as can conveniently be entered on it.

3. *Quarterly Weather Report.*—That the engraving of the plates of the Observatory curves be discontinued ; the plates up to the end of 1880 having been first completed.

4. That it is desirable to procure durable copies of the photographic records, if this can be done at a moderate cost.

As the form of the letterpress of the Quarterly Weather Report has been very recently settled by the Council, the Committee do not think it necessary to offer any recommendations with regard to it.

5. *Special Information to Newspapers.*—That it is not desirable to make any change in the present arrangements for supplying maps, diagrams, and special information to certain newspapers ; as the additional work thus imposed does not imply any great amount of mental labour, and as the payments received are the full equivalent of the time of the clerks employed.

6. *Weekly Weather Report.*—That the form of the Quarterly and Annual Statements accompanying the Weekly Weather Report be revised; and that summaries of the records of sunshine be introduced into them.

7. That inquiries be addressed to institutions and persons interested in agricultural statistics, with the view of ascertaining whether any changes could be made in the Weekly Weather Report, which would render it more useful to agriculturists.

[The following list is suggested :

The Royal Agricultural Society.	The Royal Dublin Society.
The Botanical Society.	The Agricultural Colleges.
The Horticultural Society.	Mr. James Caird.
The Highland Society.	Messrs. Lawes and Gilbert.

And any persons who have taken a special interest in the Hay Harvest Forecasts.]

(Signed) H. J. S. SMITH.
F. GALTON.

The Committee was re-appointed to consider the arrangements for the work in the department of Weather Telegraphy, particularly with reference to the issue and the checking of the Forecasts and Storm Warnings.

Submitted.—The following Report, pursuant to instructions at last meeting :—

GENTLEMEN,

I HAVE to report that the plates of the Quarterly Weather Report are in the following condition as to preparation :—

1876. Completed, with the exception of some 55 plates which require the insertion of dates, and 34 which require "cutting up" by the engraver.

1877. Just commenced ; a few plates are in various states of forwardness.

1878. Untouched.

1879. Completed, with the exception of 35 plates which require the insertion of dates.

1880. Completed, with the exception of 23 plates which require "dating" and "cutting up."

I should propose to the Council to issue the year 1876 in quarterly parts, with accompanying letterpress.

The series of plates for the year 1879 have been sent to Messrs. Malby for the insertion of dates, and will be signed for press within a week from this date.

The series of plates for the year 1880 will be ready to be signed for press by the end of the year.

The tabular matter (monthly and five-day means) for 1879 and 1880 will be ready for press by January 1, 1882.

It will therefore be possible to issue two complete years of plates and tables before the end of February 1882.

Your, &c.
(Signed) ROBERT H. SCOTT.

The Secretary was instructed to submit to the Council the Reports on the Sea Temperature, Square II., and on the "New York Herald" warnings (pp. 71, 72).

Read—A letter (No. 1970) from Mr. C. L. Wragge, inquiring if the Council would assist him in defraying the expense (9*s.* weekly) of the station he has established on Beacon Stoop, Staffordshire, at the height of 1,216 feet, and offering, if the Council could find an observer, to transfer the instruments to the Peak in Derbyshire.

The Council resolved :—I. That a Report on the value of the Ben Nevis observations for the purposes of forecasting be drawn up in the Telegraph Room. II. That the Secretary inquire from Mr. Wragge what facilities exist for telegraphic communication and for the accommodation of the observer on Beacon Stoop and on the Peak, respectively (Letter 2240).

SUBMITTED—The following STATEMENT respecting the RECORDS for May 1881, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868, and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH:—														
Action	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.
Records deficient, due to stoppage of clock	0	0	15 hrs.	15 hrs.	0	0	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orientation verified	21st	—	30th	—	12th	—	—	—	2nd	—	18th	—	9th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	0	2	1	0	0	1	3	9	10	0	2	1	15
Result of 40 *Remeasurements*:—														
Greatest difference	0·0	1·0	1·0	1·0	1·0	2·0	1·0	1·0	0·0	1·0	0·0	1·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·5	0·0	0·5	0·0	0·7	0·0	0·5	0·0	0·4	0·0	0·4	0·0	0·6
Residual difference (—Meteorological Office)	0·0	0·0	0·0	+0·2	0·0	—0·2	0·0	+0·1	0·0	0·0	0·0	0·0	0·0	0·0
RAIN GAUGE:—														
Action	Good.		Good.		Indifferent.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0		0		0	
„ „ other causes	0		0		0		0		0		0		0	
Errors in tabulation	0		3		0		2		2		1		1	

BAROGRAPH :—							
Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Indifferent.	Indifferent.	Indifferent.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0
No. of errors discovered—							
In entry of standard	0	0	1	6	4	4	0
„ calculating residual correction	0	1	1	0	3	1	0
„ applying residual correction	0	2	0	4	1	3	1
„ subtraction in subsidiary tables	0	0	2	7	1	1	1
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	1	0	0	0
Result of 40 *Remeasurements :—*							
Greatest difference	·006	·005	·005	·010	·004	·007	·005
Mean difference irrespective of sign	·002	·002	·002	·003	·002	·002	·002
Residual difference (— Meteorological Office)	·000	—·001	·000	+·001	·000	—·001	·000
Mean monthly difference between simultaneous barograph and barometer readings	·002	·002	·001	·001	·002	·001	·002

THERMOGRAPH :—														
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Indifferent.		Indifferent.		Do.		Do.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	1	1	1	1
„ „ failure of light	0	0	0	0	0	0	0	1	0	0	0	0	5 hrs.	2 hrs.
„ „ imperfectly moistened bulbs	—	3	—	3	—	0	—	0	—	1	—	1	—	0
„ „ partially frozen bulbs	—	0	—	0	—	0	—	0	—	0	—	0	—	0
„ „ other causes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	0	0	0	0	0	1	3	0	1	1	0	0	1
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	0	0	1	1	2	2	6	3	0	0	2	0
„ „ detected under glass scale	1	0	4	3	1	1	4	5	4	1	3	0	0	1
Result of 40 *Remeasurements :—*														
Greatest difference	0·2	0·2	0·3	0·3	0·2	0·2	0·3	0·3	0·3	0·3	0·3	0·2	0·3	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (— Meteorological Office)	0·0	0·0	0·0	—0·1	+0·1	0·0	+0·1	0·0	—0·1	—0·1	0·0	0·0	+0·1	0·0
Mean monthly difference between simultaneous thermograph and thermometer readings	0·2	0·2	0·2	0·2	0·1	0·1	0·2	0·2	0·1	0·2	0·1	0·1	0·2	0·2
No. of errors in maxima and minima	2	—	2	—	3	—	4	—	5	—	3	—	6	—

Submitted—The following report on the forecasts for September 1881 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecats.	Percentage of Success a + b.
Scotland, N.	a	42	31	37	77
"	b	38	42	40	
"	c	12	15	13	
"	d	8	12	10	
Scotland, E.	a	46	35	41	81
"	b	34	54	44	
"	c	12	3	7	
"	d	8	8	8	
England, N.E.	a	31	42	37	79
"	b	54	31	42	
"	c	15	19	17	
"	d	—	8	4	
England, E.	a	27	46	37	77
"	b	50	31	40	
"	c	19	19	19	
"	d	4	4	4	
Midland Cos.	a	35	46	41	81
"	b	50	31	40	
"	c	12	12	12	
"	d	3	11	7	
England, S.	a	23	46	35	71
"	b	42	31	36	
"	c	23	15	19	
"	d	12	8	10	
Scotland, W.	a	19	32	26	68
"	b	62	23	42	
"	c	12	42	27	
"	d	7	3	5	
England, N.W.	a	27	46	37	79
"	b	62	23	42	
"	c	8	23	16	
"	d	3	8	5	
England, S.W.	a	15	46	31	73
"	b	62	23	42	
"	c	19	31	25	
"	d	4	—	2	
Ireland, N.	a	15	27	21	79
"	b	65	50	58	
"	c	8	19	13	
"	d	12	4	8	
Ireland, S.	a	4	27	16	60
"	b	38	50	44	
"	c	46	11	28	
"	d	12	12	12	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	37	37	37	4
"	b	53	40	47	
"	c	7	16	11	
"	d	3	7	5	
Scotland, E.		40	30	35	86
"	b	54	47	51	
"		3	16	9	
"	d	3	7	5	
England, N.E.	a	37	30	34	77
"	b	53	33	43	
"	c	10	30	20	
"	d	—	7	3	
England, E.	a	40	33	37	79
"	b	44	40	42	
"	c	13	20	16	
"	d	3	7	5	
Midland Cos.	a	37	37	37	82
"	b	53	36	45	
"	c	10	20	15	
"	d	—	7	3	
England, S.	a	28	37	33	74
"	b	52	30	41	
"	c	13	30	21	
"	d	7	3	5	
Scotland, W.	a	10	27	19	75
"	b	67	46	56	
"	c	20	20	20	
"	d	3	7	5	
England, N.W.	a	20	37	29	74
"	b	54	36	45	
"	c	23	20	21	
"	d	3	7	5	
England, S.W.	a	30	53	42	77
"	b	44	27	35	
"	c	23	17	20	
"	d	3	3	3	
Ireland, N.	a	23	33	28	78
"	b	47	53	50	
"	c	30	7	19	
"	d	—	7	3	
Ireland, S.	a	27	40	34	70
"	b	43	30	36	
"	c	17	23	20	
"	d	13	7	10	

Summary.

British Isles	a	26	39	33	76
"	b	51	35	43	
"	c	17	19	18	
"	d	6	7	6	
British Isles	a	30	36	33	78
"	b	52	38	45	
"	c	15	20	18	
"	d	3	6	4	

Submitted—The following report (Minutes, p. 16) :—

Preliminary Report on Hygrometry.

Since May last my attention has been devoted principally to Schwackhöfer's instrument and wet and dry bulb thermometers.

1. *Schwackhöfer's Instrument.*—As mentioned in my last report, this instrument was, so far as its construction was concerned, very nearly completed. After the apparatus was put together, I proceeded to calibrate the tube by which the diminution in volume of the air contained in the burette due to the absorption of its aqueous vapour is measured. Upon this depends, of course, the accuracy of the observations. It proved a much more difficult and tedious operation than I had anticipated, but I ultimately succeeded in calibrating so as to ensure an accuracy of reading within 1 p.c. by inserting a very fine glass nozzle into the bottom of the tube and drawing up mercury by an air pump, and then allowing air to enter in small quantities at a time so as to calibrate for every

inch. The quantity of mercury which ran out was determined by weighing and the length of the tube it had occupied observed by placing a millimetre scale alongside of it, and reading off the difference of height by a telescope. The difference in volume of equal lengths of the tube deduced from these observations fully justified the precautions taken for its accurate determination.

When the calibration was completed the mercury cistern was filled up to the level of the bottom of the plunger in its highest position. It then turned out that the plunger when depressed as far as possible did not drive sufficient mercury into the burette to completely replace the air in it, and on investigation it appeared, moreover, that the burette contained more air than could be held in the absorption vessel. These defects can only be remedied by replacing the burette by a smaller one. I decided to postpone this undertaking until after September, by which time I hoped to have consulted the manufacturer of the instrument (M. E. Schneider) upon the subject in Vienna. I have since done so, but I have not at present been able to see my way to the reconstruction of the instrument.

2. *Psychrometric Observations.*—In order to compare the influence of various conditions upon the reading of the wet bulb thermometer, I have disposed ten thermometers A, B, C, D, E, F, G, H, K, L, upon a wooden screen which forms a door to an open brick fireplace, in the chimney of which a gas-jet burns. Behind the bulb of each thermometer is a circular hole which can be closed at any time by a metal plate. An extra hole has been made at which a small Casella wind gauge can be placed to determine roughly the velocity of the current of air passing over the bulbs.

Of the thermometers, K, L are dry bulbs and the rest wet. Each of the wet bulbs is covered with fine Indian muslin which has been boiled in a dilute solution of caustic potash, and well washed and boiled in distilled water. The thermometers A, B, C, D are supplied with moisture by connecting their bulbs with beakers of distilled water by fine cotton wicks treated in the same way as the muslin. From the bottoms of E, F, and G the muslin dips into the turned-up ends of tubes connected with Marriotte's bottles, so arranged as to keep the water just at the level of the mouths of the tubes into which the muslins dip, without overflowing. The bulb of the thermometer H was moistened by wetting the muslin with a brush, but that method proved unsatisfactory and the thermometer was generally not read.

The thermometers were selected so as to give the greatest available range in the size of the bulb. The approximate length of each bulb is given in Table I. below. The relative variation in diameter of the bulbs is quite as great as in the length, so that, for instance, the bulb of A has about one hundred times the capacity of that of C.

In order to compare the readings of the different thermometers a table of corrections was formed for each. All except A and D had been compared at Kew, and it was therefore only necessary to determine their freezing points. The range of A* was only from 10° to 15°, and it had therefore to be compared with one of the others between those temperatures, but it showed no observable error. The thermometer D was compared with two Kew-corrected ones for every five degrees between zero and 30° C.

The freezing points of each thermometer was determined by immersing it in finely-pounded ice well washed and rinsed with water. The results of the observation appear in the subjoined Table:—

I.

Thermometer.		Maker.	Value of Smallest Graduation.	Freezing Point.	Length of Bulb.
				°	Ins.
Wet Bulbs.					
Moistened by wicks	A	Cetti - -	0°02 C.	?	2·7
	B	Casella - -	0·2 F.	32·2	0·7
	C	Geissler - -	0·1 C.	0·0	0·4
	D	Cetti - -	0·2 C.	0·4	1·3
Moistened by Marriotte's bottles - -	E	Geissler - -	0·1 C.	0·32	1·5
	F	Geissler - -	0 1 C.	0·15	0·5
	G	Negretti - -	0·5 F.	32·3	0·9
Moistened by brush -	H	Geissler - -	0·2 C.	0·4	0·6
Dry Bulbs.					
K - - - -		Casella - -	0·2 F.	32·2	0·7
L - - - -		Negretti - -	0·5 F.	32·5	0·9

The readings of the thermometers were taken by means of a telescope placed at a distance of 6 feet from the screen on which they were mounted, after it had been ascertained by observation that the parallactic error was insensible at that distance. In order to avoid introducing any error in consequence of a change of the state of the atmosphere during the course of observation, the thermometers were read in the order A to L, and then back again in the reverse order. If a difference of more than one fifth of a degree occurred between the readings of the same thermometer the set of observations was rejected, and in case the error lay within that limit, the mean of the two readings was taken as the true one. This was then corrected for the error of reading of the thermometer, and the result expressed finally for each thermometer in the centigrade scale.

In order to obtain a check upon the mean reading of all the thermometers, the dew point was observed (sometimes by Bogen's, sometimes by Alluard's instrument) before and after each set of observations, and the mean of the two taken.

* A could be replaced, when necessary, by another similar thermometer with a range from 15° to 20°.

The following table (II.) shows a complete set of results obtained in this manner on one occasion:—

II.

Thermometers.	Gas not alight. Holes behind Thermometers marked S—*Shut*; O—*Open*. Wind Gauge Irregular.	Gas very low. Wind Gauge, 50 feet per min.	Gas half full. Wind Gauge, 65 feet per min.	Gas full on. Wind Gauge, 90 feet per min.	Gas full. Holes all open.	Gas very low. Holes all shut.
A -	No obsn.	O 14·845	O 14·78	O 14·74	14·802	15·31
B -	S 13·7	O 14·5	O 14·45	O 14·4	14·44	15·25
C -	S 13·8	O 14·85	O 14·8	O 14·76	14·85	15·19
D -	O 13·05	S 15·0	S 15·05	S 15·0	14·7	15·05
E -	O 13·34	S 14·9	S 14·9	S 14·75	14·6	14·95
F -	O 13·35	S 15·25	S 15·35	S 15·1	14·7	15·4
G -	S 13·61	O 14·6	O 14·7	O 14·5	14·6	15·05
H -	O 13·25	Not observed.				
K -	O 16·85	O 17·8	O 17·8	O 17·8	17·8	17·9
L -	S 16·95	S 17·9	S 17·9	S 17·9	17·9	18·0
Dew point	9·1	11·6	11·6	11·55	11·6	11·6

Humidity (not calculated)—

Humidity - By Jelinek's tables - *Open*	69·	69·	68·
Humidity - By Jelinek's tables - *Shut*	72·5	72·	71·5
Humidity - By Glaisher's tables - *Open*	70·	70·	69·
Humidity - By Glaisher's tables - *Shut*	72·	73·	71·
Humidity - From the dew point -	67·	68·6	68·2

The table gives one instance of many sets of observations taken in August last, which exhibited but very slight variations in consequence of the relatively small variation of the humidity of the air of the room during that month. I hope to discuss the results more fully when I have obtained a more extended group. The thermometers are now being observed daily. It may, however, be as well to notice that the size of the bulb appears to have no influence upon the indication of the instrument, nor do the different methods of moistening employed show any difference of result. In those cases in which some of the holes are open and some shut, the open holes give always the lower indications the mean values for the thermometers with holes shut in the second, third, and fourth groups of observations, being 15·05, 15·1, and 14·95 respectively, and for the open holes 14·7, 14·7, and 14·6, showing differences of ·35, ·4, and ·35, corresponding to indications of the wind gauge of 50, 65, and 90 feet per minute.

The thermometer B when the hole behind it was open always showed a lower temperature than the rest. This is probably due to the fact that its bulb was nearer to the hole than that of any of the others. In order to determine how far the temperature of a wet bulb can be further lowered by air passing by it, when all the holes were open, I directed alternately upon E and F the current of air from a foot-bellows, which when directed upon the wind gauge gave the indication 220 feet per minute.

The results were :—E. Blown -	14·65	F. Blown -	14·45
F. Not blown -	14·8	E. Not blown -	14·8
Difference -	·15	Difference	·35

I have not yet examined the cause of this difference.

I have also designed an aspiration apparatus by which to use the chemical method for comparison of the indications of the wet bulbs. It is now nearly completed.

Emmanuel College, November 10, 1881. W. N. Shaw.

With reference to the Report of the Fog Committee (Minutes, p. 15), the Secretary was instructed to write to Dr. Russell, inquiring the probable cost of the experiments which it is proposed to make "on a much larger scale" than those which the Committee have already conducted (Letter 2238).

Reported—That as Mr. Whipple had intimated (Letter 1988) that he considered it unnecessary to carry on the thermometer screen experiments at Kew (Minutes, p. 59) for a longer period, the observations had been discontinued (Letter 2183).

Reported—That the portable electrometer had been received from Glasgow (Minutes, November 11).

The Secretary having informed the Council that he had learnt from Captain Templer that the War Office balloon "Saladin" had been used for private ascents, was instructed to write to Captain Templer prohibiting the use of the balloon, except for ascents made on account of the Meteorological Council, but informing him at the same time that it was of course open to him to make application to the War Office for the use of the balloon on his own account (Letter 2239).

116, *Victoria Street, December* 2, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. GALTON.	LIEUT.-GENERAL STRACHEY.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (November 25) were read and confirmed.

The draft reply to the letter from the Royal Society printed on the last Minutes was considered and approved. The Chairman was requested to forward it to the President of the Royal Society.

The letter from the Treasury with reference to the proposed system of circumpolar observations (Minutes, p. 79) was considered, and the Chairman was requested to to draft a reply.

Read—The following letter:—

TRANSIT of VENUS, 1882.

M.O. 2121. The Royal Society, Burlington House, London, W.

December 2, 1881.

SIR,

AT a meeting of the Transit of Venus Committee held yesterday, it was resolved that application be made to the Meteorological Council for the supply of barometers and thermometers to the expeditions which are to be sent out for observing the Transit of Venus next year. I have, therefore, in accordance with this resolution, to request that you will lay before the Meteorological Council an application from the Transit Committee for the supply of eight mercurial and eight aneroid barometers, and 16 thermometers, for the equipment of the expeditions.

I remain, &c.

(Signed) ROBT. W. F. HARRISON,

The Secretary to the Meteorological Council. Secretary Transit of Venus Committee.

The Secretary was instructed to reply that the Office can only supply the instruments on condition of their being paid for, but will take back any instruments returned in good condition (Letter 2310).

Read—The following letter:—

M.O. 2101. Scottish Meteorological Society, Edinburgh,

November 29, 1881.

SIR,

THE Council of this Society being strongly of opinion that a permanent observatory for meteorological purposes should be placed on Ben Nevis, undertook during the past summer to carry out an experiment for this purpose. They placed instruments on the summit of the mountain, and were fortunate enough to secure the services of Mr. C. L. Wragge, who has proved himself so competent a practical meteorologist, and who for five months made daily elaborate observations. The Report of our Secretary as to the condition of the station, and also a sample of one day's observations are herewith enclosed. The weather observations were duly telegraphed to your Office, and appeared in the Daily Weather Reports, together with observations simultaneously made at the foot of the mountain.

In the letter which was sent from your Office dated 17th February 1879, the Meteorological Council intimated their willingness "to contribute 100*l.* a year towards the annual expenses of an "observatory on Ben Nevis, provided funds can be obtained for the erection of the building, and "that copies of the observations be regularly communicated to the Meteorological Office."

I need not point out to you that the cost of this meteorological experiment, amounting to 198*l.* 5*s.* 2*d.*, has fallen heavily upon this Society, which entirely depends on voluntary sub-

scriptions. I am requested to inquire whether the Meteorological Council are willing to aid the Society in defraying these charges.

I am, &c.

Robt. H. Scott, Esq.,
Secretary, Meteorological Council, London.

(Signed) THOMAS STEVENSON,
Hon. Sec.

Read—A letter from Mr. C. L. Wragge (No. 2102) (Minutes, Nov. 25), explaining that the nearest telegraphic stations to Beacon Stoop and to the Peak are at least three miles from those points respectively.

The Secretary was instructed to express to Mr. Wragge the regret of the Council that the places proposed by him are unsuitable as reporting stations, on account of the absence of direct telegraphic communication (Letter 2322).

The Secretary, in pursuance of instructions given at the last meeting, submitted the following papers referred to in the statements of the official work (Minutes, p. 70) :—

A. Results of Mean Sea Surface Temperature for Square III. for the months of January and July and for the years 1855 to 1871.

B. An examination into the accuracy of the warnings issued by the "New York Herald" in the years 1877–78.

Read—A letter (No. 2078) from the Admiralty, enclosing copy of a letter from Admiral Elliott, Commander in Chief at Devonport, testifying to the general accuracy of the storm warnings issued by the Office.

Read—A letter (No. 2117) from Captain Templer, stating that he would comply with the directions of the Council as to the use of the balloon "Saladin," conveyed to him in letter (written) No. 2239.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 10 logs had been received, 4 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Lieut. A. Carpenter, R.N. (commanding), Lieut. A. T. Balfour, R.N.	H.M.S. Magpie -	May 1—Aug. 31, 1881.	Surveying in China Sea -	1881, p. 45.
Capt. T. W. Freeman.	S.S. Bellerophon	July 29—Nov. 19, 1881.	China, viâ Suez - -	1881, p. 35.
Capt. T. Robinson -	Chinsura - -	Jan. 2—Oct. 13, 1881.	San Francisco - -	—
Capt. A. Simpson -	Schooner Traveller.	April 7—Oct. 17, 1881.	Ivigtut, Copenhagen -	1880, p. 109.

Mr. Scott was instructed to present the Charts (O. 27) to Captain Robinson, and to convey the best thanks of the Council to the other observers.

Submitted—The following statements of work done from October 17th to November 30th, 1881 :—

MARINE ROOM. December 1st, 1881.

Examined 20 new logs.

Cape of Good Hope District.

Wind Charts.—Revise of January large chart, with explanation and marginal notes, received examined, and returned to lithographer. The other 11 months sent for revise ; March and December received and examined. Index charts (revise of) received, examined, and returned to lithographer.

Current Charts.—Large charts for the 12 months sent to press. Revise of index charts received, examined, and sent to lithographer.

Specific Gravity, Passage and Ice Chart.—Proof received, examined, and returned to lithographer, with marginal notes added.

Letterpress.—Some time spent in preparation of List of Authorities, tables, &c., and in reading proofs and revises.

Cape Gales.—Diagrams of January Gales, Plates I. to V., corrected and sent to lithographer.

General.

Assistance given by staff of Marine Room to Lieutenant Baillie in the discussion of sea temperatures for the Atlantic Ocean.

Maturing method for discussion of barometer means for all oceans.

Prepared a Statement of Work done in the Marine Room, June 1st, 1877, to October, 1881.

Balloon ascent and work connected with observations.

HY. HARRIES.
HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq.

PANTAGRAPH ROOM.

November 30th, 1881.

Copper Plates pantagraphed:—6 plates, Nos. 1 to 6, 1877.

Zinc Plates:—Barograms, 7 plates, Nos. 4 to 10, 1877; Thermograms, 7 plates, Nos. 4 to 10, 1877; Vapour Tension, 5 plates, Nos. 3 to 7, 1877; Anemograms, 8 plates, Nos. 7 to 14, 1877; Rain Curves, none.

Photographic Curves are ruled to end of March 1877, in the case of the barograms, and to the commencement of that month, for the thermograms.

A glass thermogram scale for Kew and an anemogram scale for use in this Office have been engraved.

The new scale-value for the Valencia barograms has been checked; and the zero-point of the scale re-determined, in consequence of an alteration found to have been made in it.

The proofs of the 73 plates for 1879 have been checked and sent forward for press.

Mr. Rigby has been absent on sick-leave during nearly four weeks of the time covered by this report.

R. H. Scott, Esq., F.R.S. — R. H. CURTIS.

EXAMINATION ROOM.

SIR, December 1st, 1881.

THE following curves and tabulations have been examined:—

May: *Barograms*, five stations; *Anemograms*, seven stations.
June: *Thermograms*, two stations; *Barograms*, two stations.
July: *Thermograms*, two stations; *Barograms*, one station.
August: *Thermograms*, one station; *Barograms*, two stations.
September: *Thermograms*, one stations; *Barograms*, one station.
October: *Thermograms*, two stations; *Barograms*, two stations; *Anemograms*, two stations.

The *Notes of Errors* and *Monthly Report* thereon for *May* have been written out, and the values of the lower zero-lines partly examined.

I am, &c.
T. E. ALLEN.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary.

Reported—That Mr. B. Marshall had been engaged from 28th November as a temporary clerk at 30*s*. a week for eight hours work daily. Also that C. Pycock had been engaged as messenger boy on the 28th November at 7*s*. a week for eight hours work daily. Also that C. Heinemann had been promoted to 12*s*. a week from the 28th instant, on his undertaking the duties of Mr. Chivers, deceased.—Approved.

Reported that the following cheques for November were drawn on the 30th of that month:—

	£	*s.*	*d.*	£	*s.*	*d.*
Administration:						
R. H. Scott, salary			-	66	13	4
J. S. Harding, jun. } Salaries and wages	27	15	6			
T. D. Bell } Salaries and wages	13	6	8			
J. S. Harding, sen. } Salaries and wages	*8	19	8			
				50	1	10
Atkinson & Co., linoleum			-	1	2	0
Bank of England, on account of Stationery Office (forms sold)			-	5	17	2
Pickford & Co., carriage of parcels			-	0	14	6
Special Researches:						
C. E. Burton, salary			-	*8	8	0
G. T. Kingston, Report on Thermometer Experiments			-	10	10	0
C. E. Strachan, Arctic work			-	2	5	0
J. White, electrometer			-	12	12	6
Land Meteorology:						
J. E. Cullum (Valencia), salary			-	16	13	4
Hopkin & Williams, chemicals			-	3	5	2
W. Marriott, Meteorological returns			-	25	0	0
R. H. Curtis } Discussion, &c. of Observations	22	4	5			
J. A. Curtis } Discussion, &c. of Observations	15	11	1			
T. E. Allen } Discussion, &c. of Observations	15	11	1			
C. H. Thompson } Discussion, &c. of Observations	*9	4	0			
E. G. Aldridge } Discussion, &c. of Observations	*7	6	8			
				69	17	3
Carried forward			-	£273	0	1

* 4 weeks to the 26th November.

		£	*s.*	*d.*	£	*s.*	*d.*
	Brought forward	-		-	273	0	1
Weather Telegraphy and Forecasts:							
J. J. Hicks, thermometer screen		-		-	1	15	0
Postmaster General, telegrams		-		-	185	11	5
F. Gaster, W. L. Dallas, F. Brodie	Preparation, &c. of Weather Reports.	69	17	8			
Inspections:							
W. Marriott, contribution towards inspecting Meteorological Society's Stations		-		-	25	0	0
Ocean Meteorology:							
Capt. H. Toynbee	Discussion, &c. of observations and care of instruments.	33	6	8			
R. Strachan		27	15	6			
C. Harding		22	4	5			
H. Harries		*11	4	0			
Nav. Lieut. C. W. Baillie, R.N.		16	13	4			
					111	3	11
Henderson Bros., freight		-		-	1	7	0
H. J. Thatcher, Cardiff agent		-		-	1	17	10
Miscellaneous:							
J. J. Hicks, commissions		-		-	1	5	6
J. S. Harding, jun., petty cash		100	0	0			
" "		80	0	0			
					180	0	0
	Total	-			£850	18	5

116, *Victoria Street, December* 14, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. GALTON.	LIEUT.-GENERAL STRACHEY.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (December 2) were read and confirmed.

The Chairman reported that the reply to the letter of the Royal Society had been sent, as agreed at the last meeting.

Meteorological Office, 116, Victoria Street,
December 14, 1881.

DEAR MR. PRESIDENT,

I HAVE this morning transmitted to you a printed reply, duly authenticated by my signature, to your letter of the 17th ultimo. Other copies for the use of Members of the Council of the Royal Society have been already forwarded to Burlington House. The Meteorological Council will be most happy to supply any further information that you may desire. The Hydrographer of the Admiralty is, as you are aware, an *ex-officio* member of the Meteorological Council; and it may be proper that I should mention to you that its other members (including myself) are willing to continue their services, if such a course should seem advisable to the Council of the Royal Society.

It is true that I have not been able to ascertain Mr. De La Rue's wishes on this point, on account of his recent serious illness. But the warm interest he has always taken in the work induces me to believe that, if his health should permit, he would not refuse his consent. His absence from the Council would be a cause of the greatest regret to everyone connected with the Office.

I remain, &c.

(Signed) HENRY J. S. SMITH,
Chairman of the Meteorological Council.

To the President of the Royal Society.

DEAR MR. PRESIDENT,

Meteorological Office, December 2, 1881.

I BEG leave to acknowledge the receipt of your letter of the 17th instant, enclosing a copy of a communication addressed to yourself by Lord Frederick Cavendish, on the subject of future arrangements for the Meteorological Office.

I have laid your letter, and its enclosure, before the Meteorological Council, and I am requested by them (in accordance with your invitation) to forward to you, for the information of the Council of the Royal Society, and, if you should so think fit, for eventual transmission to the Treasury, the following remarks on certain matters affecting the position of the Office at the present time, which they desire to bring under the notice of the Government.

I. The Annual Reports of the Meteorological Council have already furnished the Council of the Royal Society, and the Treasury, with full information as to the proceedings of the Office during the last four years, and as to the general results of its work. A general interest in the scientific study of weather, both in this country and abroad, has unquestionably been fostered by the publications of the Office and of similar foreign establishments; and cannot fail to contribute to the future advancement of the science by ensuring the co-operation of an increasing number of competent observers, and even more by attracting to the theory of changes of weather an increasing amount of attention from scientific men. The establishment and maintenance of meteorological organisations in all the principal countries of Europe, in the United States of America, in many of the British Colonies, and notably in British India, supplies a proof of the general concurrence of opinion as to the value of such institutions, and might be cited (if it were needed) as an argument to justify the continued application of public funds to the support of meteorology in this country.

II. The relations of the Office to the meteorological systems of foreign countries have continued to be of the most friendly kind. With the view of maintaining these friendly relations, the Council determined to take part in the International Congress of Meteorology held at Rome in 1879, and deputed their Chairman, and their Secretary (Mr. R. H. Scott, F.R.S.), to represent them at the meeting. An English edition of the Report of the Congress was prepared and published by the Office. A standing International Meteorological Committee was appointed by the Congress, and the Council have sanctioned the acceptance by Mr. Scott of the honorary post of Secretary to this Committee.

The stations in connexion with the Office on the western and north-western coasts of the British Isles are, it may be said, the meteorological outposts of Europe, and daily reports received from them are immediately transmitted to the Continent. Until the 1st of September in the present

year the duty of issuing storm warnings to the northern and north-western coasts of France devolved upon the Meteorological Office, and the accompanying letter (A) may serve to show that this duty has been discharged in a manner satisfactory to the Ministry of Marine. Owing to the more complete organisation which has now been introduced into the French meteorological system, the responsibility of warning the French coasts is no longer confided directly to the English Office; but the "Bureau Central de Météorologie" in Paris still depends in great measure on the telegrams which it receives from London for the issue of its storm warnings, and has asked to receive special additional telegrams whenever storm warnings are issued by the Office to the southern British coasts.

The advice of the Council has been frequently asked upon questions arising in connexion with the meteorological systems of the Colonies and of India. The supply of instruments to many of the Colonial systems passes, almost as a matter of course, through the Office.

The Council are glad to state that they have received much valuable aid from the co-operation of private persons and societies interested in meteorology. The Royal Agricultural Society, the Royal Dublin Society, and the Highland Society have assisted them, in England, Ireland, and Scotland respectively, in the establishment of a tentative system of forecasts, issued to a certain number of agriculturists during the hay harvest seasons of the last three years. The observations made at the stations of the Meteorological Society (of England) have been communicated to the Office at the sole cost of copying, and, in return, the Council has assisted the Society to defray the cost of the inspection of those stations. The Scottish Meteorological Society has continued in friendly relations with the Office; and has allowed its Assistant Secretary, Mr. Alexander Buchan, F.R.S.E., to undertake, at the request of the Council, the duty of inspecting the Scottish stations in connexion with the Office. The Council has also arranged for the immediate publication in a compact form of the results obtained during the last 15 years from nearly 400 stations belonging to the system of observations of British rainfall, organised by Mr. G. J. Symons, F.R.S., and maintained entirely by volunteer observers.

As the Hydrographer of the Admiralty is an *ex-officio* member of the Council, it may seem almost superfluous to state that the Hydrographic Department has at all times co-operated most cordially with the Council, and that the stores of information contained in the Logs and Remark Books of Her Majesty's Ships have been unreservedly placed at their disposal for investigations in Ocean meteorology. The Council desire, however, to repeat on this occasion the expression of their sense of the important service rendered to meteorological science by the Lords Commissioners of the Admiralty in assenting to the request of the Council that simultaneous observations at 0h. 8m. p.m. Greenwich mean time (being the hour now generally agreed on by meteorologists) should be taken on board Her Majesty's Ships when on foreign service, in addition to the observations required by the Service Regulations.

The Council have also to express their thanks to H.R.H. the Admiral Superintendent of Naval Reserves, to the Elder Brethren of the Trinity House, and to the Commissioners of Irish Lights, for courteous assistance which has rendered it possible to organise during the last three years a fairly complete system of observations of Sea Surface Temperature round the coasts of the British Isles.

III. Until the month of May in the present year the telegraphic messages received by, and sent from the Meteorological Office were allowed the same priority as is given to telegrams sent by Government Offices. But the authorities of the Post Office have been advised that the priority clauses in the Telegraph Acts of 1863 and 1868 do not apply to messages on the business of the Meteorological Office, and have accordingly felt themselves compelled to withdraw the privilege of priority hitherto enjoyed.

The Council respectfully submit that the restoration of this privilege is highly desirable. They would point out (1) that the telegraphic storm warnings, and the telegraphic information upon which the warnings are founded, require the annual expenditure of a large sum of public money; (2) that the value of the storm warnings depends entirely on the earliness of the information which the Office receives, and on the promptitude with which the telegrams it issues are forwarded; (3) that the priority asked for could probably be conceded, without causing any appreciable inconvenience to anyone.

IV. The Meteorological Office expends annually on telegrams a sum varying from 1,700*l.* to 1,800*l.*; almost the whole of this sum, however, being repaid to the Government through the Post Office. The cost of the telegrams from each reporting station is at least 18*l.* a year, in many cases three times that amount; the cost of each general storm warning exceeds 6*l.* The charge for messages received is made at "press rates." The messages issued, including all storm warnings, are charged for at ordinary rates; and as they are usually very brief, nothing would be saved, even if they were charged for at "press rates." The Council submit that it would be conducive to the usefulness of the Office if its shorter telegrams were charged for at a special rate, so as to give it a greater power of making use of the telegraphic system, on which the success of its operations so much depends. There would seem to be no risk of abuse of any privilege thus granted, and there would be no difficulty on the part of the Office in adopting a code for the transmission of its telegrams, in order to diminish as far as possible the work thrown on the Telegraphic Department of the Post Office.

V. It was stated in the Report of the Office for the year 1881, recently submitted to the Royal Society, that until the end of the year 1880 the weather information and forecasts issued daily at 8 p.m. were regarded as a separate service, and under an arrangement sanctioned by the Treasury,

were paid for by the newspapers publishing them; the sum received by the Office on this account varying from 900*l.* to 1,000*l.* per annum. In December 1880, the Treasury, after communication with the Council, arrived at the conclusion that it would be for the public advantage to issue the 8 p.m. forecasts *gratis*, and, to enable the Council to carry this arrangement into effect, increased the annual grant to the Office by 500*l.* (viz, from 14,500*l.* to 15,000*l.*). The difference between 900*l.* or 1,000*l.* (the sum formerly received from the newspapers) and 500*l.* (the amount by which the grant has been thus increased) represents an annual loss to the Office of 400*l.* or 500*l.*; and this loss falls upon a department (that of weather telegraphy) which at the present moment is the most in need of strengthening, owing to the increasing demand for early and accurate meteorological information, coupled with the increasing importance (in a scientific point of view) of the study of weather changes at the very time of their occurrence, or as soon after as may be. The Council have endeavoured to exercise a careful economy in this as in other branches of the work of the Office; but they find (after nearly a year's experience of the new system) that their efforts to introduce improvements into the weather service have been impeded by the diminution in the revenue of the Office. They therefore respectfully press on the consideration of the Government the advisability of making up for the deficiency by a corresponding increase in the grant; the grounds on which they base this application being that the deficiency has been occasioned, not by any increased expenditure incurred by them, but by a change of system required (and no doubt with good reason) by the Government, and that so far as the grant might be spent on telegraphy it would be to a great extent nominal.

VI. None of the *employés* in the Office have at present any claim to superannuation allowances, and the position of the Office is such that as the matters now stand this could not be remedied. The Meteorological Council consider that this is a serious disadvantage; and, though they are aware that the question is not exempt from difficulties arising from the peculiar circumstances of the Office, they hope that the Government may be able to deal with it in a satisfactory manner. Much of the business of the Office can only be transacted by a permanent staff, the adequate performance of whose duties requires special qualifications, as computers, draughtsmen, and the like, with, in some cases, considerable scientific knowledge, and long continued experience in their respective departments. It appears to the Council that in the case of such persons the introduction of a system of superannuation is recommended by the same considerations of fairness and public utility which have led to its adoption in the Civil Service generally. To enable an estimate to be formed of the charge which would have to be undertaken by the Government, if the proposal now made were carried into effect, a list (B) is annexed including the names of the persons who would probably be affected by the arrangement, and showing the length of time for which each of them have served.

VII. The Council have in conclusion to express the favourable sense which they entertain of the manner in which the staff of the Office have performed their duties. From their Secretary, Mr. R. H. Scott, F.R.S., they have received a loyal support; and his long experience of the business of the Office, and extensive acquaintance with the literature of Meteorological Science, have been of great value to them. The regularity with which he has conducted the complicated daily and other services of the Office appears to them deserving of the highest praise. In the Department of Ocean Meteorology the same standard of order and regularity in the dispatch of business has been maintained by the Marine Superintendent, Captain Toynbee.

I have, &c.
(Signed) HENRY J. S. SMITH,
Chairman of the Meteorological Council.

A.

MONSIEUR, Paris, le 9 Août 1881,

DEPUIS plusieurs années, le service d'avis de tempêtes organisé d'après vos indications, fonctionne, à la grande satisfaction de nos marins, sur les côtes de France, de Dunkerque à Rochefort; et les signaux sont, comme vous le savez, arborés en exécution des avertissements donnés par le Meteorological Office de Londres.

M. le Directeur du Bureau Central météorologique de France vient de me faire connaître qu'à la suite de l'expérience acquise maintenant, et grâce aux relations télégraphiques régulières qu'il entretient avec l'office Britannique, il pense être en mesure de fournir directement les prévisions en question à nos ports.

En conséquence, et conformément à la demande de M. Mascart, j'ai l'honneur de vous informer que le Bureau Central météorologique de France se chargera désormais de la transmission à nos ports des *Avis de mauvais temps;* et que, d'après l'accord établi avec M. le Ministre des Postes et des Télégraphes, ce nouveau service fonctionnera à dater du 1er Septembre prochain.

En vous donnant avis de ces dispositions, et au moment où le Meteorological Office de Londres va cesser l'envoi de ses avis de coups de vent, je tiens, Monsieur, à exprimer la vive gratitude du Département pour les services importants que cet Office nous a rendus, pendant de longues années, en adressant ses avertissements, si hautement appréciés par la Marine Française et par nos populations du littoral.

Je m'empresse, d'ailleurs, d'ajouter que la nouvelle disposition énoncée dans la présente dépêche concerne seulement les avis de tempêtes; et que l'Office de Londres continuera d'envoyer, dans les mêmes conditions que par le passé, la dépêche météorologique quotidienne donnant les pressions barométriques, la direction et la force du vent, l'état du ciel et celui de la mer.

Recevez, Monsieur, les assurances de ma considération la plus distinguée.

LE MINISTRE DE LA MARINE ET DES COLONIES.

Monsieur Robert Scott,
Secrétaire du Meteorological Office de Londres.

B.

LIST of the STAFF and CLERKS in the METEOROLOGICAL OFFICE (according to date of entry), together with their POSITIONS in the OFFICE, SALARIES, &c.

	Name.	Position in Office.	Date of Entry.	Salary.
				£
	R. H. Scott	Secretary to the Council	1867	800
	H. Toynbee	Marine Superintendent	1867	400
A. B.	J. S. Harding, jun. (1)	Chief Clerk	1855	333
A. B.	R. Strachan (2)	1st Senior Clerk	1858	333 (*a*)
A. B.	F. Gaster	2nd „ „	1859	367 (*b*)
B.	J. S. Harding, sen. (3)	Office Keeper and Store Clerk	1860	117
B.	C. Harding	3rd Senior Clerk	1861	267
B.	R. H. Curtis	4th „ „	1861	267
	G. G. Francis	5th Junior Clerk	1869	200 (*b*)
	F. Brodie	4th „ „	1869	238 (*b*)
	J. A. Curtis	1st „ „	1869	187
	T. D. Bell	6th „ „	1869	160
	T. E. Allen (4)	2nd „ „	1871	187
	W. L. Dallas	3rd „ „	1872	238 (*b*)
	The following have served in the Office as temporary clerks for periods of six years and upwards :—			
	R. Sargeant	- - - - -	1871	123
	C. H. Thompson	- - - - -	1873	120
	H. N. Cobley	- - - - -	1874	109
	A. J. Rigby (5)	- - - - -	1874	146
	H. Harries (6)	- - - - -	1875	146
	W. Allingham (7)	- - - - -	1875	146

The ordinary hours of the Office for the Clerks are 8 : from 9 a.m. to 5 p.m.

A. These clerks have passed the Civil Service Examination as Temporary Clerk, Board of Trade, in 1863 or 1864.
B. These clerks were transferred from the Board of Trade, 1867.
a. Including special allowance for care of instruments.
b. Including an additional allowance for extra hours and Sunday attendance.
(1) Private Secretary to Admiral FitzRoy, 1863.
(2) January 1850—August 1855: Pupil Teacher, Royal Naval Schools, Greenwich, under indentures to the Admiralty; August 1855—August 1856: Teacher of Navigation under Board of Trade, holding certificates from Science and Art Department; August 1856—August 1858 : in charge of Chronometer Testing Office under Board of Trade.
(3) Age specially provided for by Treasury, August 1863. Formerly Assessor and Collector of Taxes.
(4) Formerly Meteorological Assistant to Mr. J. Glaisher, F.R.S.
(5) Formerly Meteorological Assistant at Kew Observatory for work (in connexion with the Meteorological Office) for five years.
(6) Passed "Excise" examination, June 1863, but declined appointment.
(7) 5½ years' service as "Writer" at the Admiralty ; passed preliminary examination for Class I., Civil Service.

The following draft reply to the letter from the Treasury (Minutes, p. 79) was adopted, and the Secretary was instructed to forward it:—

2,049.

SIR,

IN reply to your letter 19046/81 of the 22nd ultimo, I am instructed to say—

1. With regard to the importance of simultaneous circumpolar observations, the Council would refer to their letter to the Royal Society dated May 19, 1881, a copy of which is appended to the letter from the Foreign Office, returned herewith.

2. As to the probability of success, it may be explained that the immediate object in view is nothing more than the prosecution of the most complete system of simultaneous circumpolar observations found to be practicable, and the Council have every reason to believe that the plan will be carried into effect at a sufficient number of stations to ensure a useful result.

3. The proposed establishments will not be permanent, as the observations are only to be carried on from August 1882 till September 1883.

The Council would not be disposed to recommend any plan involving a wintering expedition in a part of the Arctic Regions difficult of access.

They believe that the establishment of an observing party at one of the more northern of the Hudson's Bay stations, which are tenanted all the year round, would fall within the scope of the plan contemplated, and would form a valuable addition to it.

They suggest that Fort Simpson, on the Mackenzie River, in latitude 61° 51′ N., where Lieut.-General Sir J. H. Lefroy observed for some months in 1843, would be a suitable position.

The Council having communicated with the Governor of the Hudson's Bay Company on the subject, are led to believe that observers might be sent to Fort Simpson and established there without any material difficulty. A party of four, consisting of one principal observer, and three or four assistants, would probably be sufficient.

Further particulars, if desired, as to the cost of transport and maintenance of the observers could be ascertained from the Hudson's Bay Company, who would doubtless place all the facilities in their power at the service of the expedition.

The choice of observers would probably be best left to the Canadian Government, after consulting their meteorological officers. The cost of instrumental outfit would not be heavy.

I am, &c.,
(Signed) ROBERT H. SCOTT,
Secretary.

The Secretary of the Treasury.

Read—Letter 2123 from the Colonial Office, enclosing a copy of the Report of the Botanic Gardens at Trinidad for 1880, "for any observations the Council may have to offer."

The following reply was adopted, and the Secretary was instructed to forward it (Letter 2440):—

I am instructed to inform you that the Council consider that the establishment of a Meteorological Observatory in Trinidad is highly desirable, and they agree generally with the remarks contained in Articles 36 to 41, inclusive, of the Report on the Botanic Gardens for 1880, by Mr. Prestoe, Government Botanist.

The Council will be glad to give their advice on any points of detail that may be submitted to them.

The Secretary reported that on Sunday morning, December 11, he had received a telegram from Captain Templer, from Weymouth, stating that the balloon "Saladin" had been blown out to sea on the previous evening at Bridport, and that Mr. Walter Powell, M.P., had been carried off in the car.

He further reported that on the 12th instant Captain Templer had come to the Office and handed in a preliminary report of the occurrence, which had been forwarded by the Office to the London daily press; that telegrams had been at once sent to the Channel Islands and to the Ministère de la Marine, Paris, inquiring if anything had been seen of the balloon; and that on the 13th the following letter had been sent to the War Office with a copy of Captain Templer's report enclosed:—

P. Copy 2,406.

Meteorological Office, London,
December 13, 1881.

SIR,

I REGRET to have to inform you that on Saturday last the balloon "Saladin" was caught by a gust of wind on the coast at Bridport, broke away, and was carried out to sea.

I enclose a copy of a report of the occurrence by Captain Templer, from which you will see that the balloon when it escaped carried with it Mr. W. Powell, M.P., who had been assisting Captain Templer in making the observations.

Up to the present time no tidings have been obtained of the balloon or its occupant.

I am, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

Major-General T. L. J. Galwey, R.E.,
Inspector-General of Fortifications,
War Office.

SIR,

I REGRET to report that on Saturday, the 10th of December, I ascended at Bath, accompanied by Mr. Walter Powell and Mr. Agg Gardner, at 1h. 55m., for the purpose of taking the temperature of the air, and the amount of snow in the air, for the Meteorological Office. I cleared the snow clouds at 4,000 feet altitude; the temperature of these clouds was 28°, and the wet-bulb thermometer read 26°. At 4,200 feet we passed over Wells, the time being 2h. 50m. At this height I worked over Glastonbury; the temperature now rose to 41°, and the sky was perfectly clear. I passed then between Somerton and Landport, and I here found that I was in a N. ½ W. current. I asked Mr. Powell to send the ballon up to 6,000 feet, to ascertain the temperature of a small bank of cirrus. I found this temperature to be 31°, and then I asked him to place me at 2,000 feet altitude, to regain the N. ½ W. current, and we then came in view of Crewkerne. I now kept at a low altitude until I reached Beaminster. Mr. Powell here observed that we were going at 30 miles an hour, and here we first heard the roar of the sea. The balloon suddenly rose to 4,000 feet. At this time I said to Mr. Powell, "Go down to within 100 feet of the earth and ascertain our exact position." We coasted along close to the ground until we reached Symondsbury. I here called to a man and asked him how far the distance was to Bridport, and he said about a mile. I asked Mr. Powell to prepare to "take in;" our pace now increasing to 35 miles an hour. To avoid the little village of Eype, Mr. Powell threw out some ballast. This took us to 1,500 feet elevation and we had still two miles to get in. I opened the valve and descended about 150 yards short of the cliff The balloon on touching the ground dragged a few feet, and I rolled out of the car with the valve line in my hand. This caused the balloon to ascend about 8 feet, when Mr. Gardner dropped off, and unfortunately broke his leg. I found that the rope was being pulled through my hands, and I called to Mr. Powell, who was standing in the car, to come down the line. He took hold of the line, and in a few more seconds the line was torn through my hands. The balloon rose rapidly. Mr. Powell waved his hand to me, and I took his compass bearings, and found that he was going in a S. ½ E. direction. Some men coming up, I placed Mr. Gardner in their charge and sent word to the Coastguard and Bridport Harbour-master to keep a good look out, and to go out with boats. I then proceeded to Bridport and telegraphed to the Commanding Officer, Royal Engineers, Weymouth, to have a steamer in readiness for me to go in search. I proceeded to Weymouth and found the S.S. "Commodore" with steam up. I here received a telegram from Bridport Harbour-master saying

that the balloon had been seen to drop in the sea south of Bridport. I at once proceeded to sea searched the alleged place of his descent, making due allowance for the wind and current. This proving unsuccessful, I crossed the Channel till we sighted the Casquets Light, and then returned in a N.W. direction, ultimately reaching Weymouth about 5h. a.m. on Sunday morning, and have organised further search. I am of opinion that what was seen to fall into the sea was not the balloon, but part of the gear, thrown out to lighten the balloon, as the balloon could not have fallen so close to the shore as to be visible at about 5h. p.m.

I have, &c.
(Signed) JAMES TEMPLER,
Captain 7th Batt. King's Royal Rifle Corps.

R. H. Scott, Esq., F.R.S.,
Secretary, Meteorological Office.

The Secretary was instructed to write to Captain Templer, asking for a complete report, stating the objects of the expedition, and the arrangements made for taking the observations and managing the balloon (Letter 2417).

The application of the Scottish Meteorological Society for assistance in defraying the cost of the Ben Nevis observations (Minutes, December 2) was considered.

The Secretary was instructed to reply that the Council would grant 100*l.* toward the cost incurred, but that this assistance would not be renewed except on the condition of a permanent observatory being established. He was further instructed to say that the use of a high-level station such as Ben Nevis, with reference to the obtaining of early intelligence of changes of weather, is under consideration at the Office, and that the Council would be glad to learn if the Scottish Meteorological Society have any information, not likely to be in the possession of the Office, as to the weather in Central Scotland, which could assist the Council in forming an opinion on the subject (Letter 42/82).

Submitted—The following Report of the Committee appointed to consider the arrangements for Weather Telegraphy (Minutes, p. 81) :—

M.O. 2247.

With reference to the Daily Weather Report, the Committee recommend—

That pp. 2 and 3 should (from and after the first convenient day for such a change) stand as in the rough specimen submitted (not printed here), the charts being, however, slightly reduced so as to include the whole area now represented, and the main rivers being inserted in blue ;

That p. 4 remain unchanged ; the explanation of the weather symbols being, however, transferred to p. 1, and the space thus gained being utilised to improve the heading ;

That there be given on p. 1 : (*a*) Beaufort's degrees of wind force, the nautical definitions being omitted, and the accepted equivalents in velocity being given ; (*b*) Beaufort's Weather Notation ; (*c*) the scale of sea disturbance.

The Committee think it worthy of consideration whether the space available on the first page might not ultimately be occupied by small charts illustrating various types of weather, to which reference should be frequently made in the remarks and forecasts. They are aware, however, that the selection and discussion of the types to be thus represented would be a matter of some difficulty, and would occupy a considerable time.

Read—A letter from Mr. C. L. Wragge (No. 2205) renewing his offer of observations from Beacon Stoop (Minutes, December 2).

The Secretary was instructed to reply that the Council must repeat that the observations would arrive too late to be available for forecasting, unless they could arrange for a line to the top of Kinder Scout or Beacon Stoop, which at present they are not in a position to do (Letter 2427).

Read—A memorandum from Captain Toynbee reporting that since the last meeting nine logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Comr. P. Aldrich, R.N , Lieut. E. J. W. Slade, R.N.	H.M.S. "Fawn"	Jan. 21—Sept. 24, 1881.	Malta, Red Sea, Mauritius, Delagoa Bay.	1880, p. 82.
Capt. A. E. Barlow, C. H. S. Tocque, Esq.,2nd Officer.	S.S. "Rosetta"-	July 27—Nov. 28, 1881.	China, Bombay, and home	1879, p. 60.
Capt. W. N. Lailey	S.S. "Cipero" -	June 12—Oct. 21, 1881.	Glasgow, Trinidad, and Demerara.	—
Capt. C. J. Russell -	Ship "Baroda" -	April 15—Nov. 27, 1881.	Liverpool, Calcutta.	—

Mr. Scott was instructed to present the charts (O. 27) to Captains Lailey and Russell and to Messrs. Slade and Tocque, and to convey the best thanks of the Council to the other observers.

Submitted—The following report on the checking of forecasts for the month of October 1881:—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	21	38	30	74
"	b	46	42	44	
"	c	12	12	12	
"	d	21	8	14	
Scotland, E.	a	25	25	25	67
"	b	50	33	42	
"	c	13	17	15	
"	d	12	25	18	
England, N.E.	a	33	38	36	65
"	b	38	20	29	
"	c	12	25	18	
"	d	17	17	17	
England, E.	a	30	38	34	82
"	b	58	37	48	
"	c	8	17	12	
"	d	4	8	6	
Midland Cos.	a	17	30	24	78
"	b	54	54	54	
"	c	21	12	16	
"	d	8	4	6	
England, S.	a	42	50	46	84
"	b	42	34	38	
"	c	12	8	10	
"	d	4	8	6	
Scotland, W.	a	25	42	34	73
"	b	46	33	39	
"	c	17	17	17	
"	d	12	8	10	
England, N.W.	a	29	50	40	75
"	b	50	21	35	
"	c	13	17	15	
"	d	8	12	10	
England, S.W.	a	33	46	40	83
"	b	50	37	43	
"	c	9	13	11	
"	d	8	4	6	
Ireland, N.	a	33	58	46	79
"	b	46	21	33	
"	c	17	13	15	
"	d	4	8	6	
Ireland, S.	a	25	50	38	86
"	b	67	29	48	
"	c	4	13	8	
"	d	4	8	6	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	27	37	32	77
"	b	47	43	45	
"	c	16	17	17	
"	d	10	3	6	
Scotland, E.	a	30	40	35	70
"	b	43	27	35	
"	c	17	10	14	
"	d	10	23	16	
England, N.E.	a	40	37	39	74
"	b	37	33	35	
"	c	16	13	14	
"	d	7	17	12	
England, E.	a	44	40	42	81
"	b	33	44	39	
"	c	20	13	16	
"	d	3	3	3	
Midland Cos.	a	27	30	29	72
"	b	36	50	43	
"	c	30	17	23	
"	d	7	3	5	
England, S.	a	43	40	42	79
"	b	37	37	37	
"	c	13	16	14	
"	d	7	7	7	
Scotland, W.	a	23	37	30	70
"	b	47	33	40	
"	c	20	17	19	
"	d	10	13	11	
England, N.W.	a	30	43	37	72
"	b	47	24	35	
"	c	16	23	20	
"	d	7	10	8	
England, S.W.	a	30	43	37	72
"	b	50	20	35	
"	c	7	30	18	
"	d	13	7	10	
Ireland, N.	a	33	27	30	77
"	b	54	40	47	
"	c	10	27	19	
"	d	3	6	4	
Ireland, S.	a	33	33	33	72
"	b	43	34	39	
"	c	17	23	20	
"	d	7	10	8	

Summary.

British Isles	a	28	42	35	77
"	b	50	33	42	
"	c	13	15	14	
"	d	9	10	9	
British Isles	a	33	37	35	74
"	b	43	35	39	
"	c	17	19	18	
"	d	7	9	8	

The subject of the work to be undertaken by the Marine Room, on the completion of the Cape charts, was considered, and it was resolved—

1. That Captain Toynbee be requested to consider the memorandum on the discussion of the barometer readings for the Oceans of the Globe (Minutes, 1880, p. 126), and to offer to the Council any suggestions thereon which may occur to him.

2. That Mr. Baillie be requested to prepare a report as to the mode of discussion and the form of publication to be adopted for the observations of sea surface temperature.

The Secretary reported—That in reply to his letter, No. 2238 (Minutes, p. 86) to Dr. Russell, he had heard (Letters 2170, 2191, and 2225) that the cost of the proposed experiments would be about 70*l.*, and that by the Chairman's instructions he had authorised an expenditure up to that amount (Letters 2352).—Approved.

Read—Letters (written) 2299, (received) 2154 and 2224, relative to training one of the assistants at Kew to the use of Thomson's portable electrometer for balloon ascents.

The Secretary was instructed to arrange that the experiments should be made under Mr. Whipple's superintendence, by any assistant at Kew whom he may select.

Read—Applications for the publications of the Office from the Imperial Leopold-Caroline Academy, Halle, and, for the Marine publications, from the Marine Institute at Amsterdam, affiliated to the Utrecht Institute.—Granted.

116, *Victoria Street, December* 29, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. GALTON. | PROFESSOR STOKES.

THE HYDROGRAPHER.

The Secretary was in attendance.

Read—The following letter:—

M.O. 2320.

SIR, India Office, S.W., December 20, 1881.

I AM directed by the Secretary of State for India in Council to forward, for the information of your Council, a copy of a letter and its enclosures, just received from the Government of India, containing proposals for the further improvement and development of meteorological observations and reports in India, and I am to ask you whether your Council is able to recommend any gentleman duly qualified for the post of scientific assistant to the Meteorological Reporter to the Government of India.

I am further to ask for the favour of any observations on the subject of these papers which your Council may wish to make.

A copy of the enclosures to this letter has been forwarded to the Science and Art Department for communication to the Committee on Solar Physics.

I am, &c.

The Secretary, Meteorological Office, 116, Victoria Street, S.W. (Signed) ENFIELD.

(Enclosure.)

No. 7 of 1881.—Government of India.

Revenue and Agricultural Department.—Meteorology.

To the Right Hon. the Marquis of Hartington, H.M. Secretary of State for India.

MY LORD MARQUIS, Simla, November 7, 1881.

IN continuation of our despatch, No. 2, dated the 14th March 1881, submitting a copy of the Report on the Administration of the Meteorological Department of the Government of India for the year 1879–80, and of our orders thereon, we now have the honour to forward a copy of the Meteorological Reporter's reply,* and of the resolution† recorded by the Government of India on the several proposals made by him for the further improvement and development of Meteorological observations and reports.

2. With reference to pars. 7 and 15 of the resolution, we beg to solicit your Lordship's approval to the appointment of a scientific assistant to the Meteorological Reporter, on a salary rising from Rs. 500 to Rs. 750; the engagement for two years of a trained sapper capable of conducting actinometric observations, on a monthly pay of Rs. 250; and the purchase of the Winstanley instrument, described in paragraph 55 of Mr. Blanford's letter.

3. Should these appointments be approved, we venture to suggest that the scientific assistant should be selected from the London Meteorological Office, and that before coming out he should be permitted to familiarise himself with the methods of reduction practised in the Marine Department of that Office, as well as with the work of the Daily Weather Reports. It would be a great advantage also if he could go through a course at the Kew Observatory to complete his qualifications in the above particulars, and with this object he might be put on duty (on the usual rate of duty allowances to Indian officers in England) for one or two months before leaving for India. It will be observed that his duties will involve frequent and long journeys, and it would, therefore, be very desirable that the officer appointed should be unmarried and possess a good constitution.

4. The qualifications required of the sapper are set forth in paragraph 56 of Mr. Blanford's letter, and it has been decided to fix his salary at Rs. 250 per mensem, that being the rate of allowance granted to a sapper engaged on similar duties some years ago.

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* Letter No. 3 S, dated 8th June, and appended statements.

† No. 1, 27–39, dated 27th October 1881.

5. We do not consider it necessary to enter here upon a detailed statement of the necessity for these appointments, as this has already been done in the papers herewith submitted; but your Lordship will perceive that they form an essential part of the scheme, prepared by the Meteorological Reporter and approved by us, for giving effect to the recommendations contained in paragraphs 34 to 41, Part I. of the Report of the Famine Commission. We trust they will meet with your Lordship's favourable consideration.

We have, &c.
(Signed) WH. STOKES.
RIVERS THOMPSON.
J. GIBBS.
T. F. WILSON.

Read—The following letter (Minutes 1880, p. 41) :—

M.O. 2280.

SIR, Colonial Secretary's Office, Fiji, September 27, 1881.

I AM directed by the Governor of Fiji to acknowledge the receipt of your letter to him, dated the 1st July, and to inform you in reply that, appreciating highly the kind offer of the Meteorological Council to supply instruments to this Colony, his Excellency regrets that as the staff of the Colony is as yet insufficient for the due performance of even more important duties, he does not see his way to provide for the correct observations and regular returns such as would alone justify the acceptance of the gift in question.

I have, &c.
The Secretary, Meteorological Council. (Signed) JOHN B. THURSTON.

Submitted—The following report :—

M.O. 2378.

REPORT on the SCOTTISH METEOROLOGICAL STATIONS of the METEOROLOGICAL OFFICE for 1881.

The barometers at all the stations except Laudale were compared with—

(*a.*) Inspector's Standard Barometer No. 588, which had been received from the Meteorological Office since the previous inspection in 1880, and

(*b.*) A small pocket Aneroid No. 11.

I have the strongest reasons for believing that the above mercurial standard No. 588 was entirely free from air during the whole time of the inspection, and is still at this date in the same satisfactory condition. I have also the pleasure of reporting that the behaviour of this instrument has been all that could be wished during the various tours of inspection, having never gone out of order though handled and treated, so far as known, just as No. 456 had been.

The following table shows the readings of inspector's standard No. 588, corrected for the index error of the instrument; the readings of aneroid No. 11; and the uncorrected readings of the reporting and check barometers at each of the stations, adding in red (printed in italic) figures the corrected readings of those barometers, the errors of which I happen to know :—

TELEGRAPH REPORTING STATIONS.	Inspector's Barometer, No. 588.	Attached Thermometer.	Aneroid, No. 11.	Reporting Barometer.	Attached Thermometer.	Check Barometer.	Attached Thermometer.	REMARKS.
Laudale -	—	—	29·495	29·610	60·6	—	—	No. 376 at height of 33 feet.
Do. -	—	—	29·505	—	—	29·611	59·1	No. 375 at height of 25 feet.
Stornoway -	29·930	56·0	29·875	29 926	56·0	29·926	55·5	——
	—	—	—	*·927*	—	*·926*	—	
Nairn -	29·793	60·6	29·690	29·794	60·9	29·793	60·4	——
	—	—	—	*·792*	—	*·792*	—	
Inverness -	29·639	63·6	29·545	29·640	63·8	—	—	——
	—	—	—	*·639*	—	—	—	
Wick -	29·562	57·9	29·470	29·564	57·7	—	—	No. 568 in shop.
	—	—	—	*·565*	—	—	—	
Do. -	29·508	59·0	29·425	—	—	29·506	59·2	No. 569 in house.
Sandwick -	29·429	60·0	29·340	29·445	61·0	—	—	
	—	—	—	*·432*	—	—	—	——
Dunrossness -	29·617	58·3	29·555	29·614	58·8	29·614	58·8	
Aberdeen -	29·465	61·6	29·380	29·463	61·7	—	—	No. 537 in Telegraph Office.
	—	—	—	*·463*	—	—	—	
Do. -	29·432	59·2	29·330	—	—	29·436	59·3	No. 538 at house, Braemar Place.
	—	—	—	—	—	*·434*	—	
Leith -	30·126	61·7	30·080	30·125	62·1	—	—	No. 561 in Telegraph Office.
	—	—	—	*·128*	—	—	—	
Do. -	30·049	57·3	30·020	—	—	30·045	57·0	No. 562 at house.
	—	—	—	—	—	*·047*	—	
Ardrossan -	29·828	53·2	29·805	29·824	53·3	—	—	No. 564 in Ardrossan.
	—	—	—	*·829*	—	—	—	
Do. -	29·798	55·1	29·770	—	—	29·792	55·2	No. 563 at house, Saltcoats.
	—	—	—	—	—	*·794*	—	

This comparison can only be regarded with the greatest satisfaction. In no case where a comparison of "corrected" readings is made does the difference between inspector's standard and the station barometers exceed 0·004 inch.

An examination of the column under "Aneroid No. 11" shows that the action of this aneroid during the period of inspection was extremely irregular. I am not aware that any accident happened to the instrument between the inspections of 1880 and 1881, but it is now evident that its readings are too irregular and uncertain for any reliance to be placed on them during the extended period of an inspection.

THE OBSERVATORIES.

1. *Aberdeen.*—The following are the readings of the standard barometer No. 1149, with which the eye observations are made, and inspector's standard No. 588:—

—	Self.	—	Mr. Boswell.	—
	inches.	°	inches.	°
Inspector's Standard, No. 588 (corrected) -	29·416	59·7	—	—
Observer's Standard, No. 1149 (corrected) -	29·420	60·0	29·420	60·0
Aneroid, No. 11 - - - -	29·325	—	—	—

2. *Glasgow.*—A new barometer (Adie No. 1722) was added to the observatory on September 17, 1881, being brought from London and placed in position by Mr. Whipple. The following are the readings of the inspector's standard No. 588, the new observatory standard No. 1722, and the old standard:—

—	Self.		Mr. McLean.	
	inches.	°	inches.	°
Inspector's Standard, No. 588 corrected.	29·429	47·4	—	—
New observer's Standard, No. 1722 „	29·430	47·7	29·430	47·7
Old observer's Standard uncorrected.	29·422	47·8	29·421	47·8
Aneroid, No. 11 - - - -	29·430	—	—	—

The new observer, Mr. Urquhart, made the same readings as Mr. McLean, the old observer. From this comparison it is probable that the error of the old standard was 0·008 inch too low, a result which would bring the observations made with the instrument into correspondence with those made at surrounding stations.

Mr. Urquhart, who shows considerable intelligence, on being asked to set and read the vernier, set it as near as I could estimate, 0·010 inch too high, which surprised me, as his reading exactly agreed with the reading I had made and noted. The explanation was seen at once on examining the ivory point which was just as much above the surface of the mercury in the cistern as the vernier was above the mercury in the tube. The proper method of setting the ivory point and the vernier was very particularly explained, after which Mr. Urquhart set both correctly, and read the instrument, giving the same reading exactly as by the first method he used.

It is probable, though the remark is made with some reservation, that the above method of setting the instrument has been for some time the common practice, and if so the limit of the observational error may be set down at 0·003 inch, perhaps only on rare occasions amounting to so much.

The following are the differences between the readings of the same instrument by inspector on the one hand, and by observer and assistant on the other:

—		Observer.	Assistant.
Telegraph Reporting Station	Laudale - -	0·000	—
	Stornoway -	−0·005	—
	Nairn - -	−0·002	−0·004
	Inverness -	0·000	—
	Wick - -	0·000	0·000
	Sandwick -	0·000	0·000
	Dunrossness -	0·000	—
	Aberdeen -	0·000	0·000
	Leith - -	−0·001	—
	Ardrossan -	0·000	—
Observatories - -	Aberdeen -	0·000	—
	Glasgow -	0·000	0·000

Mr. Sutherland, the observer at Stornoway, and Miss Penny, the assistant observer at Nairn, had their attention drawn to their rather low readings; and after the proper method of setting the vernier had been explained, readings of the barometers were again made in each case, with correct results.

Thus as regards the Scottish stations of the Meteorological Council, I have the gratifying report to make that none of the barometers differ from the standard carried round the stations during the inspection of 1881 more than 0·004 inch, and that part, if not the whole, of this difference may be

due to the attached thermometer not strictly representing the temperature of the whole instrument, though every care was taken to hang thetwo barometers together long enough to obtain this result approximately; and that the errors of setting the vernier and reading off do not exceed – 0·002 inch.

THERMOMETERS.

The following table gives the results of the comparisons made with inspector's standard thermometer, No. 2420, and the thermometers at the different stations and observatories, the readings of the standard being corrected for instrumental errors, none of the Kew corrections for the station thermometers, however, being allowed for in preparing the table:—

STATIONS.	Standard No. 2420, corrected.	Dry Bulb.	Wet Bulb.	Spare T.	Max.	Min.	Time in Water in Minutes.	Change of Temp.	Notes.
	°	°	°	°	°	°		°	
Laudale -	59·6	+0·2	+0·2	—	+0·3	+0·1	105	+0·2	
Stornoway -	56·2	+0·6	+0·5	—	−0·2	−0·4	90	+0·3	
Nairn -	61·7	+0 2	+0·7	+0·7	+0·1	+1·0	100	+0·2	
Inverness -	59·1	+0·1	+0·2	—	−0·1	0·0	95	+0·2	
Wick -	58·5	+0·4	+0·4	—	+0·1	+0·2	90	uniform	
Sandwick -	54·6	+0·3	0·0	—	+0·5	−0·4	190	+0·6	Increase mostly first hour, water often stirred.
Dunrossness-	56·4	+0·4	+0·4	—	+0·4	−0·4	170	−0·1	
Aberdeen -	59·4	+0·4	+0·5	+0·5	+0·5	+0·1	105	−0·2	
Leith -	56·2	+0·3	+0·5	—	+1·5	−0·1	60	+0·3	
Ardrossan -	48·2	+0·2	+0·1	+0·3	0·0	−0·3	130	uniform	
OBSERVATORIES.				Max. T. No.10579	Max. T. No. 10	Min. T. 150 No. 5433			
Glasgow -	47·1	+0·3	0·0	+0·1	+0·2	−0·1		−0·2	
						No. 1222			
						+0·2	Min.		
Aberdeen -	56·7	0·0	+0·6		+0·5	+0·1	120	uniform	These are the Kew errors.

The method of making these thermometric comparisons is the same in all cases, and may be explained by the comparison made of the Glasgow thermometers in October last. The comparison is made in a room with no fire at the time, if it be possible to obtain such a room. A hand-basin is filled two-thirds with water, and if this water be not very approximately at the same temperature as that of the room itself, it is brought to it by pouring in warmer or colder water as may be required. The water is frequently stirred. The bulbs are placed as close together in the water as possible, and none of them is allowed to be in contact with the bottom of the basin. After the readings are taken and noted down, a frequent practice is to again compare each thermometer with the standard *seriatim*, holding the two in the hand with their bulbs in contact and stirring the water with them for a short time. The cloth is in every case removed from the wet bulb thermometer, and care is taken to see that the mercury of the maximum thermometer is properly shaken home, and the better to secure this, means are taken to provide rather for an increase than a lowering of the temperature of the water during the comparison.

The whole of the comparisons during the tour of inspection were made with standard thermometer No. 2420. I did not use in the comparisons at the Stations No. 710 which had been forwarded to me at Kirkwall, to replace the second standard I carry with me, which had been unfortunately broken, because these two standards, Nos. 2420 and 710, did not agree on being compared together. Thus, on comparing a few weeks ago the thermometers used last summer by Mr. Wragge on the top of Ben Nevis, I used both standards, Nos. 2420 and 710. They read the same, viz., 49°·3, to which applying the Kew corrections for each the corrected readings are:—

Standard No. 2420 was 49°·0.

Standard No. 710 was 49°·3.

In the above comparison the thermometers were in the water together upwards of a day, the temperature of which varied but little, and the two thermometers did not perceptibly differ from each other on any of the five or six occasions they were read together. As regards the comparison at the Aberdeen Observatory, it has been remarked under the column *Notes*, that each of the thermometers gave readings exactly agreeing with the standard No. 2420, after the Kew corrections had been applied. The difference between the corrected readings of the two thermometers, viz., No. 2620 and No. 710 is the same viz., 0°·3 from 40° to 80°.

HYGROMETERS.

These are all in a satisfactory condition, and attention appears to be given to change the cloth when required. The only exception is in the case of Ardrossan, where the cloth was of too thick and heavy a texture, so as to result in an undue sluggishness of the instrument. This will be rectified in future.

In all cases the method of manipulating the wet bulb during frosts was again dwelt upon at length, so as to secure, as far as possible, greater uniformity among these observations.

BOX FOR THERMOMETERS.

At Laudale the bulbs of the dry, wet, and minimum thermometers were 3 ft. 9 ins. above the grass. I gave orders to raise them to 3 ft. 11 ins., it not being possible without a new stand to raise them to 4 ft.

At Nairn these bulbs were 3 ft. 10 ins. above the grass. Orders were given to raise them to 4 ft., which can easily be done.

At all the telegraphic reporting stations good positions have been secured for the protected thermometers, and they are all practically at the same uniform height of 4 ft. from the ground. These are, therefore, good climatological stations, and the observations of temperature made at them may be used for climatological purposes and inquiries.

RAIN GAUGES.

At every reporting station except Laudale the rim of the rain gauge is 12 ins. above the ground. Orders were given to lower this gauge to 12 inches.

At Leith the rim was distinctly distorted from the circular form, but was set right after the squeeze was made. The cutting down of the shrubs close to this gauge, referred to in my special report, has materially improved the situation of this instrument.

At Dunrossness the rain gauge was a good deal out of order, but a new one was daily expected. The observations made, however, with the old gauge are not likely to have been materially in error.

The rim of the registering rain gauge at King's College, Aberdeen, was deformed, so that the longest diameter was 0·10 inch longer than the shortest. Of course, no attempt was made to rectify it; otherwise the instrument appeared to be in excellent order.

A new rain gauge, 8 inches in diameter, has been added since the inspection of 1880. Its rim is 2 feet above the ground, or the height of the registering rain gauge.

CHANGES OF INSTRUMENTS DURING YEAR.

The only noteworthy change in the position of instruments during the year has been the removal of the thermometers and rain gauge at Ardrossan from the grounds of the Eglinton Arms Hotel to the grounds of the Public Baths. The new position is preferable to the old one. A small plan of the new station, with the position of the instruments, accompanies this report. The position is, it will be observed, close to the sea, and on three sides surrounded by it. As compared with the last position, it has the additional advantage of being quite removed from the shipping in the harbour and all public works.

NEW STATION IN INVERNESS.

All the instruments at this station are very good, and Mr. Fraser, the observer, reads them accurately, and is very anxious to make his observations good.

The barometer is kept in his shop in the town, at a height of 40 feet above mean sea level; and the thermometers and rain gauge in the garden attached to his mother's house, which is one of a large number of small gardens attached to the houses of Charles Street, Hill Terrace, and King's Mill. The position, though somewhat confined, may be characterised as tolerably good. Plans of the station are enclosed.

(Signed) ALEXANDER BUCHAN,
Inspector Scottish Stations.
Dec. 26, 1881.

Read—The following letter (Minutes 1880, p. 95) :—

M.O. 2342. Meteorological Society, 30, Great George Street,
Westminster, S.W., December 22, 1881.

DEAR SIR,

I HAVE much pleasure in informing you that I have completed the charts for the proposed Meteorological Atlas which I forward herewith.

The Temperature Charts are 13 in number, viz.: one for each month and one for the year, and are based upon the results of observations from 78 stations.

The Barometric Charts are also 13 in number: viz: one for each month, and one for the year, and are based upon the results of observations from 47 stations.

As the lines of barometric pressure are not constants throughout the year, I have thought it desirable to prepare charts for each month instead of only one for every three months, and I now forward them for the consideration of the Council.

The time occupied upon the work has been 556 hours.

Yours, &c.
(Signed) WILLIAM MARRIOTT.

R. H. Scott, Esq., F.R.S., Secretary,
Meteorological Office.

Mr. Scott reported that the discussion of the Sea Surface Temperatures for the year ending June 1881 had not yet been completed by Mr. Marriott.

Resolved—That Mr. Marriott be requested to consider what explanations might with advantage be placed upon the Charts, and to prepare letter-press to accompany them. (Letter 33) 1882.

Submitted—The following reports :—

WITH reference to the Minute of the Council of December 14th :—

"That Captain Toynbee be requested to consider the memorandum on the discussion of the Barometer Readings for the Oceans of the Globe (Minutes 1880, p. 126), and to offer to the Council any suggestions thereon which may occur to him."

I have the honour to report that after carefully considering the memorandum, and conferring with Lieutenant Baillie and Mr. C. Harding, I would suggest that the extractors of the data from the logs may be trusted to apply the correction for temperature *mentally*. This will prevent the necessity for *recording* the temperature, and enable us to plot the data on charts, by which method it will be possible to get out means for spaces of any size decided on by the Council, down to a one-degree Square.

(Signed) HENRY TOYNBEE,
Marine Superintendent.

19/12/81.

WITH reference to the Minute of Council of the 14th inst., "That Mr. Baillie be requested to prepare a report on the mode of discussion and the form of publication to be adopted for the observations of S a Surface Temperature," I have the honour to make the following suggestions:

1. That the Sea Surface Temperature Charts be printed on the same scale as, and contain all the data of the originals.

2. That Isothermal Charts of the whole globe, and for the four representative months, be drawn on a reduced scale from the large Charts, so that they may appear under one view on a sheet of the same size as the Indian Ocean Chart.

The whole series of Charts would then consist of the following:—

1 single sheet containing four charts of the world		= 1 leaf.
4 „ *Indian Ocean* - - -		= 4 „
4 double sheets (folio) *Pacific Ocean* - -		= 8 „
4 „ „ *Atlantic Ocean* - -		= 8 „
Total 13 charts represented by - - - -		21 leaves.

This arrangement would admit of the whole of the data being printed, and the publication when complete would be of the same size as the Admiralty "Wind and Current Charts," but would contain about double the number of leaves, say 25 leaves, which would allow four leaves for introduction and remarks on the physical features peculiar to each ocean, method of dealing with the observations, authorities from which the data are obtained, &c. &c.

(Signed) C. W. BAILLIE,
Nav. Lieut., R.N.

(Signed) H. TOYNBEE,
Marine Superintendent.

The form of publication suggested by Mr. Baillie was approved.

Read—A memorandum from Captain Toynbee reporting that since the last meeting two logs had been received, both of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Ellery -	"Majestic" -	May 2—Nov. 30, 1881.	London and Calcutta -	1880, p. 128.
Capt. James Gordon	S.S. "City of Agra."	Sept. 24—Dec. 12, 1881.	Liverpool and Calcutta -	1880, p. 122.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

The proposal to discuss synoptically the weather of the North Atlantic for a definite period with a view of obtaining information as to the previous history of the systems of weather arriving on the coast of Europe from the West (Minutes, 1880, p. 94) was considered, and it was agreed that, with the object of co-operating with the proposed system of circumpolar observations (Minutes, Dec. 14), it was highly desirable that the period should be the same as that chosen for the continuance of the circumpolar system, viz., from August 1, 1882, to August 31, 1883.

It was resolved that Captain Toynbee be requested to report—

1. As to the best mode of obtaining sufficiently numerous observations, and as to the probability of the requisite assistance being received from the shipping interest.
2. As to the area over which the system of observations should be extended.
3. As to the number of observations *per diem* which should be asked for.
4. As to the form in which the observations should be furnished, *e.g.*, whether in the ship's or the meteorological log, or on a special form to be supplied by the Office.
5. As to the mode of discussion, and as to the form in which the results of the discussion should be published.

Read—The following letter (Minutes, Dec. 14) :—

St. Pétersbourg, Londres et Copenhague,
ce 20 Décembre 1881.

MONSIEUR,

LE rapport ci-joint de la troisième conférence polaire internationale mentionne (p. 13 § 40) que cette conférence a prié le président de la Commission polaire internationale de vouloir bien faire les démarches nécessaires pour que, durant les expéditions polaires internationales, les observatoires déjà existants dans les zônes tempérées et tout spécialement sur l'hémisphère austral, fassent de même des observations météorologiques et magnétiques plus complètes et participent aux observations magnétiques des jours termes.

Le Comité international de météorologie, institué par le deuxième Congrès international des météorologues à Rome, ayant déjà dans sa réunion à Berne (le 10 Août, séance du matin), résolu de concourir autant que possible aux travaux de la Commission polaire, les soussignés ont l'honneur de vous prier au nom de ces deux institutions internationales, de vouloir bien contribuer à l'accomplissement du voeu exprimé dans le paragraphe mentionné.

Sans doute les observations simultanées à faire sur huit points au moins de la région arctique et quelques points de la région antarctique offriront une rare occasion pour combler la grande lacune dont souffrent les observations régulières des zônes tempérées et des tropiques. Vous conviendrez donc qu'il vaut bien la peine de faire aussi des efforts extraordinaires dans les observatoires météorologiques et magnétiques déjà existants sur les deux hémisphères pendant la durée des expéditions polaires. Pour cela il faudrait multiplier, au besoin, les observations quotidiennes et participer surtout aux observations magnétiques des jours termes.

Dans le rapport mentionné vous trouverez indiqués ces jours termes ainsi que le commencement et la fin des observations simultanées. Les paragraphes 1—34 contiennent de même toutes les autres instructions qui ont paru nécessaires pour garantir la conformité et la comparabilité des observations des différents endroits.

Nous vous prions de vouloir bien faire connaître au premier des soussignés, dans quelles limites votre observatoire pourra participer aux observations projetées et surtout aux observations magnétiques des jours termes.

Veuillez, Monsieur, agreér en attendant l'assurance de notre considération distinguée.

Le président du Comité international de météorologie et de la Commission polaire internationale :
H. WILD.

Le Secrétaire du Comité international de météorologie :
R. H. SCOTT.

Le secrétaire de la Commission international polaire :
N. HOFFMEYER.

Reported—That H. G. Brown had been appointed to assist in the Pantagraph Room (in place of Woolston, resigned in June 1881), at a weekly salary of 7*s.* for eight hours' work per diem.

116, *Victoria Street, January* 20, 1882.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last two meetings (December 14 and 29) were read and confirmed.

Read—The following report (Minutes, December 14) :—

7, Park Place, St. James' Street, London, S.W.,
December 31, 1881.

SIR,

IN reply to your letter, I beg to submit the following additional report of the balloon ascent of December the 10th instant. In accordance with your instructions to take meteorological observations from time to time, I held myself in readiness to make an ascent the first favourable opportunity. On Friday, the 9th instant, London being enveloped in a very peculiar fog, I was anxious to ascertain the atmospheric conditions which might have produced it. On that day I was unfortunately detained in the train by the fog, but I determined to make the ascent on the following day, Saturday, December 10th. The balloon "Saladin" was at Bath, so I wrote to you that I would ascend from that place. I took Mr. Walter Powell as my assistant, for the management of the balloon. The following are the conditions under which the "Saladin" was equipped on that day :—

The capacity of the balloon was 38,600 cubic feet, giving an ascensional force of 1,700 lbs., under the conditions of filling as explained below.

The weights carried were as follows :—

	lbs.
Envelope, net, valve, hoops - -	350
Car - - - - -	80
Anchor - - - - -	40
Rope - - - - -	8
Line - - - - -	10
Gear - - - - -	4
	492
Instruments - - - -	42
Kit - - - - -	40
	574
Self - - - - -	198
Mr. W. Powell - - -	156
Mr. A. Agg-Gardner - - -	140
Ballast - - - - -	632
	1,700

The balloon therefore carried in total ballast at starting 632 lbs.

Having a good ascensional force, I found that I could take Mr. A. Agg-Gardner, and he rendered me valuable assistance in checking the time with the chronometer. I had 300 lbs. of ballast ready, and I ordered 400 lbs. more to be made up at once. I now tied on the car, tested my lift by placing four men in the car with 300 lbs. of ballast, and then got on the car myself, and found that the balloon had good ascension, and with this load I had it towed to a good place to ascend from. At 1h. 30m. p.m. Mr. Powell, whose duty it was to navigate the balloon and to place it at the different altitudes necessary for the observations, and Mr. Agg-Gardner, took their places, the instrument bags were lashed on, the men taken out, and the 400 lbs. additional ballast put in. I filled up the meteorological forms, and at 1h. 54m. I got in, and by throwing out 20 lbs. of ballast the balloon left the earth. I give the observations from memory, as the whole of the notes were with the instrument bag and were lost with the balloon. We cleared the town in six minutes.

ASCENT from BATH by CAPTAIN TEMPLER, 10th December 1881.

Balloon, "Saladin." Capacity 38,600 cubic feet, and Weight 492. Nature of charge, C_2H_4, 44 lbs. buoyancy per 1,000 cubic feet.

Load of balloon.—Captain Templer, Mr. Walter Powell, and Mr. A. Agg-Gardner. Ballast, 632 lbs. Instruments, 82 lbs.

A.—OBSERVATIONS ON THE GROUND.

Time.		—	Letter on Chart.	Aneroid Barometer.	Thermometer.		Wind.		Cloud.	Weather.	Remarks.
Hour.	Minute.				Dry.	Wet.	Force.	Direction.			
1	50	At starting -	A.	29·75	31	28	1	North	c	m	Object of ascent :— Capt. Templer to make observation of the temperature and the height of clouds. Mr. A. Gardner to give the times by chronometer. Mr. Walter Powell to work the balloon.
4	35	On alighting -	T.	—	—	—	6	N.½W.	c low down.	q	

B.—OBSERVATIONS DURING THE VOYAGE.

Time.		Topographical Indications.	Letter on Chart.	Aneroid Barometer.	Thermometer.		Cloud.						Weather.	Remarks.
							Above.		Around.	Below.				
Hour.	Minute.				Dry.	Wet.	Apparent Direction of Motion.	Character.	Character.	Apparent Direction of Motion.	Character.			
1	55	Bath -	A.	29·75	31	28								At 2,000 feet altitude we made the lowest reading 26° Fahr. At 4,000 feet altitude we met a little snow. At 4,200 feet altitude 41°. The whole of the atmosphere above was warm and clear. Average temperature, 40°. Highest reading, 41°.
3	45	Wells -	B.	28	27	26	—	—	—	—	—	Cirrus above		
			C.											
			D.											
			E.	23·85	43	39	S.	b	b	S.S.E.	m	Sky perfectly clear above.		
			G.											
			H.											
4	40	Eype Bay -	T.											

The buoyancy of 38,600 cubic feet of coal gas, C_2H_4, at a temperature of 40°, the air temperature being 32° is, at 44 lbs. per 1,000 cb. ft., 1,700 lbs.

Balloon - -	492 lbs.
Passengers - -	491 „
Instruments - -	82 „
Ballast - -	632 „
	1,700 „

The barometer reading at starting was 29°·7 ; the thermometer read 31° Fahr.

The direction of the wind N.

At 2,000 feet altitude we found the lowest thermometrical reading 26°.

At 4,000 feet we met a snow cloud ; temperature 28° ; wet bulb 26°.

At 2h. 45m. we passed clear of Wells at 4,200 altitude, sky clear above, and temperature 41°.

After passing Langport we found we were in a N. ½ W. current, and we here rose to 6,000 feet altitude to a small cluster of cirrus ; its temperature was 31°.

The average temperature of the clouds was 28°, and the temperature of the atmosphere averaged 40°, our highest reading being 43°. I plotted the course on the chart, and marked the currents that we had met and the velocities at which we travelled.

Crewkerne was sighted when we were at 2,000 feet altitude, and Mr. Powell allowed the balloon, at my request, to descend, and we passed Beaminster, where we first heard the sea, and immediately I verified my position, and we prepared to effect our descent. The horizontal velocity was here increased to 35 miles an hour. The balloon was descending most favourably near Symondsbury when Mr. Powell threw out some ballast.

On his telling me that he had done so, I immediately opened the valve. He then asked me if this was necessary? I answered, "We are nearing the sea," and he replied, "I am afraid I rather "overdid that last ballast." Glancing downwards I found that our pace had increased. I asked Mr. Agg-Gardner to hold the valve open while I looked out for a place to descend ; he did this, but almost immediately I took the valve line and never allowed the valve to close until the line was torn from my grasp after I had been thrown out and dragged for about 60 yards.

When we were about 200 feet distant from the earth Mr. Powell said he could touch the earth with his pilot line, and after a pause he said to me, "Shall I part [*i.e.* drop] the anchor?" I said, "No," as I considered it was not the proper moment to do so. I may here state that it was Mr. Powell's duty to part the anchor and any ballast that would be requisite to check too rapid a descent, while I continued to keep the valve open, and he would not have appealed to me had he not felt doubtful on the point. Immediately after this we touched the earth at about 4h. 40m. p.m. in the second field, or about 500 yards from the cliff. The car was capsized and turned right over, and I was thrown violently out ; Mr. Gardner was thrown out at the same time, as also were several bags of ballast. Mr. Powell was, I think, partially thrown out, but, as far as I could see, he had hold of the hoop, and the car righting underneath him he recovered his position. I retained my hold of the valve line and was dragged along the earth by it for a considerable distance. I tried very hard to get the line between my teeth, and could I have done so, I have no doubt the balloon would have been crippled. I shouted to Mr. Powell to come down the line. At this time he was close to me and about 8 feet from the earth. The line was then torn from my grasp by a succession of jerks, both my hands being severely lacerated. The balloon then floated along close to the earth for some 300 feet, until it reached a fence, which the car grazed as it went by. I had risen to my feet and could see Mr. Powell standing up in the car, and, in my opinion, three courses were open to him, as an aeronaut of experience, to effect his own safety from the moment the line was torn through my hands until the car grazed the fence : (1.) Jumping out, as at no time was the car more than 8 feet from the ground ; (2.) Throwing out the grapnel ; (3.) Opening the valve again. Possibly he imagined he could save the balloon by opening the valve after it reached the cliff, so as to descend under its lee ; but the balloon, after passing the fence, began to ascend and continued to do so steadily for about 10 minutes, when it was lost to my sight in the clouds I took the direction of its moton by compass, and I conjecture from our experience of the high current that day, that Mr. Powell, if it was in his mind to cross the Channel, would attempt to work the low current, and I fear that to work this course the balloon would require more ballast than he had. He had with him the instrument bag, the kit bag complete, about 100 lbs. of ballast under the seat, and the balloon wrapper. The valve was in order when its line left my grasp ; had it not been so the balloon would not have risen. To the best of my belief the balloon itself was also perfectly unscathed. After the accident had taken place I hailed a man, who was about 300 yards off, for assistance, Mr. Gardner telling me his leg was broken.

As soon as the balloon was out of sight and fearing it might come down in mid-channel, I told Mr. Gardner I must leave him, as I must go and see if I could rescue Mr. Powell ; though suffering terribly, he most unselfishly said, "Go."

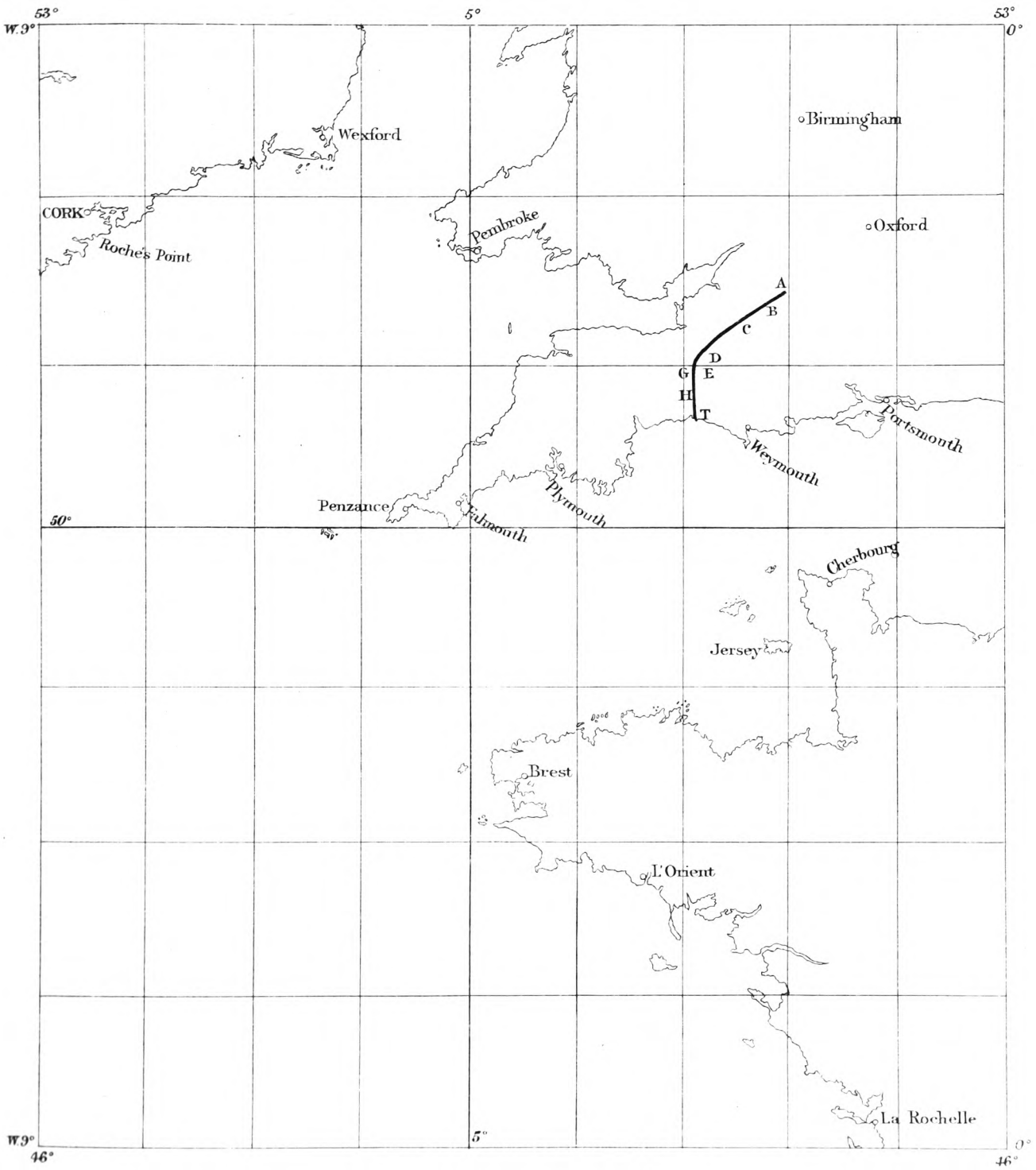
My action during the evening and night has been reported in my former letter. I feared that Mr. Powell was in imminent danger of coming down in mid-channel. But owing to my own knowledge of his aeronautical experience and determination, I had great hopes that he would make the French coast. He had often proved that he was a most fearless aeronaut, and had made more than 20 ascents this year, having a perfect knowledge of the whole management of a balloon.

I lament most deeply the untimely fate of my gallant friend ; but I have the melancholy satisfaction of feeling that both at the moment of the accident and afterwards, nothing was left undone which could have averted it.

I have, &c.

(Signed) JAMES TEMPLER,
Capt. 7th Bat., King's Royal Rifle Corps.

To R. H. Scott, Esq.,
Secretary, Meteorological Council.



MAP SHOWING TRACK OF BALLOON.

Decr. 10th 1881.

Fredk Dangerfield Lith. London 1881.

Read—The following letter:—

MO.84.

SIR, War Office, January 7, 1882.

YOUR letter of the 13th ultimo, reporting the circumstances of the loss, on the 1st December, of the War Office balloon "Saladin," has been laid before the Secretary of State for War, who desires me to request that you will draw the attention of the Meteorological Council to the terms, in War Office letter of 23rd June 1881, $\frac{84}{\text{Genl. No. } 2778}$, upon which this balloon was lent.

I have, &c.

The Secretary to the Meteorological Council, 116, Victoria Street, S.W. (Signed) T. L. GALLOWEY, Inspector of Fortifications.

The Secretary was instructed to send the following reply (Letter 84):—

M.O. 84.

Meteorological Office, 116, Victoria Street, London, S.W., January 20, 1882.

SIR,

IN reply to your letter of the 7th instant (No. 84, Genl. No. 2812), and in further continuation of my letter of the 13th ultimo, I am instructed by the Council to enclose to you, for the information of the Secretary of State for War, a copy of Captain Templer's final report to them, which embodies all the information they have been able to collect respecting the loss of the balloon "Saladin."

The Council desire me to say that they deeply regret the occurrence and that as they are fully aware of the conditions under which the balloon was lent, they only await your instructions as to the equivalent to be paid in money for the lost balloon, and as to the return of the stores, &c.

I am, &c.

Major-General T. L. Gallowey, R.E., Inspector-General of Fortifications, War Office, Pall Mall. (Signed) ROBERT H. SCOTT, Secretary.

Reported—That the War Office (Letter 116) had inquired if the Office could supply information as to the average force of wind and height of sea on the south-east coast of England, and that a reply had been sent (Letter 129), stating what materials existed in the Office to supply the required information. Approved.

Submitted—The following memoranda:—

MATERIALS for preparing ESTIMATES for Year 1882–83.

Administration:	£	s.	d.	£	s.	d.
(1.) Council				1,000	0	0
(2.) Secretary				800	0	0
(3.) Salaries and Wages: Three clerks, office-keeper, and messenger	706	4	0	710	0	0
(4.) Rent, Fuel, and Lighting: Expenditure for one year ending 30th September 1881*	665	5	9	650	0	0
(5.) Incidental and contingent Expenses: Expenditure for one year ending 30th September 1881*	347	4	1			
Addition for Fittings, Furniture, &c.	70	0	0			
During 12 months ending 30th September 1881 the sum of 231*l.* was spent upon internal painting, fittings, &c., very little having been expended on this account for some years.	417	4	1	420	0	0
Special Researches and Experiments				1,000	0	0
Carried forward				£4,580	0	0

* Minutes, p. 70 (1880); pp. 9 and 65 (1881).

	£ s. d.	£ s. d.
Brought forward - - - -		4,580 0 0
Land Meteorology:		
(1.) Observatories and other Stations: Expenditure for one year ending 30th September 1881* - - - - - -	2,407 4 6	2,400 0 0
(2.) Discussion and reduction of Observations: 10 clerks, engraver, and 2 boys - -	1,483 6 8	1,480 0 0
Weather Information and Forecasts:		
(1.) Telegraphic Reports and Storm Warnings: Expenditure for one year ending 30th September 1881* - - - - - -	3,065 8 10	
(2.) Repayments at rate of 6 mo. ending 30th September 1881 - - - - -	684 7 10	
It is assumed that the bonus (Minutes, 1878–79, p. 22) to the telegraphic reporters will be continued.	2,381 1 0	†2,520 0 0
(2.) Preparation and issue of Reports and Forecasts: Eight clerks and one boy - - -	1,409 2 8	
Assuming that the arrangement of June 1879 will be continued, and 50*l.* charged against "Research" - - - - -	50 0 0	
	£1,359 2 8	†1,470 0 0
Inspections:		
Salaries and Expenses: Expenditure for one year ending 30th September 1881* - - - -	555 13 1	500 0 0
The expense under this head has been steadily increasing for some years; the actual expense of the last 12 months exceeds the amount now allocated by more than 50*l.* The allowance of 25*l.* to the Meteorological Society is charged under this head.		
Ocean Meteorology:		
(1.) Discussion and Reduction of Observations: Marine Superintendent, assistant, and eight clerks - - - - - -	1,770 6 8	
Proportion chargeable to care and issue of instruments (say) - - - £200		
Assuming that the arrangement of June 1879 will be continued, and 100*l.* charged against "Research" - 100		
	300 0 0	
	1,470 6 8	1,470 0 0
(2.) Proportion chargeable to care and issue of instruments - - - - -	- -	200 0 0
Carried forward - -	- -	£14,620 0 0

* Minutes, p. 70 (1880); pp. 9 and 65 (1881).
† Addition proposed from increase of vote.

	£ s. d.	£ s. d.
Brought forward - - - -		14,620 0 0
Ocean Meteorology—*continued.*		
(3.) Supply of instruments to Royal Navy :— Expenditure for one year ending 30th September 1881* - - - - -	260 3 8	250 0 0
(4.) Supply of instruments to the Mercantile Marine : Expenditure for one year ending 30th September 1881* - - - - -	314 0 11	†400 0 0
There is not much comparison between the expense in one year and in another under this head.		
(5.) Distant Island (or Coast) Stations - - - -		30 0 0
The *regular* charges under this head do not exceed 25*l.*, but the estimated amount is subject to fluctuation owing to the occasional supply of instruments. Thus in the 12 months ending September 1881 the expenditure amounted to 98*l.*		£15,300 0 0

METEOROLOGICAL OFFICE : ESTIMATES for the Year 1882–83.

Heads of Service.	Proposed for 1882–83.		Voted for 1881–82.		1882–83. Increase.	1882–83. Decrease.
	£	£	£	£	£	£
Administration :						
Payment of Council - - -	1,000	- -	1,000			
Secretary - - - - -	800	- -	800			
Salaries and wages - - -	710	- -	710			
Rent, fuel, and lighting - - -	650	- -	650			
Incidental and contingent expenses -	420	- -	420			
		3,580		3,580		
Special Researches and Experiments -	- -	1,000	- -	1,000		
Land Meteorology :						
Observatories and stations - - -	2,400	- -	2,380			
Discussion and reduction of observations -	1,480	- -	1,450			
		3,880		3,830	50	
Weather Information and Forecasts :						
Telegraphic reports and storm warnings -	2,520	- -	2,420			
Preparation and issue of Reports and Forecasts - - - - - -	1,470	- -	1,420			
		3,990		3,840	150	
Inspections :						
Salaries and travelling expenses - -	- -	500	- -	500		
Ocean Meteorology :						
Discussion and reduction of observations -	1,470	- -	1,320			
Expenses incidental to the supply of instruments :						
Care and issue of instruments -	200	- -	200			
Royal Navy - - - -	250	- -	250			
Mercantile Marine - - -	400	- -	450			
Distant islands (and coast stations) -	30	- -	30			
		2,350		2,250	100	
Totals - - - -	- -	£15,300	- -	£15,000	£300	

The Secretary was instructed to forward the estimates to the Treasury (Letter 165).

* Minutes, p. 70 (1880); pp. 9 and 65.
† Addition proposed from increase of vote.

Submitted—The following report:—

With reference to the minute of the Council of December 29th, 1881, requesting me to report:—

1. "As to the best mode of obtaining sufficiently numerous observations, and as to the probability of the requisite assistance being received from the shipping interest."

I have the honour to report—

(*a.*) That I think it would be well to draw up an advertisement stating that the Meteorological Council propose to discuss the meteorology of the North Atlantic from August 1st, 1882, to August 31st, 1883, and asking for the co-operation of all owners of ships, captains, and officers who have to do with vessels on that ocean during that time.

That this advertisement might be published in important newspapers and posted at shipping offices, custom-houses, and other public places which are resorted to by owners, captains, and officers of ships.

(*b.*) That I think we shall get a large number of men ready to help.

2. "As to the area over which the system of observations should be extended."

That it would be well to deal with the whole North Atlantic, as light might be thrown on the possible connexion between the hurricanes of the West Indies and the storms of higher latitudes; and on other interesting points, such as the relation of the trade winds to the central area of high pressure in the Atlantic, the mean position of that area in each month, and its range with the seasons.

3. "As to the number of observations *per diem* which should be asked for."

That much depends on what style of work the Council propose to undertake.

If it is desired to plot a daily observation at a given hour of Greenwich time, the best data would be got from a ship's log, as the numerous observations and remarks would enable us to interpolate for the data at that hour very correctly.

A ship's log would also enable us to find the hour when a marked change of wind struck a ship, by which means we should be able to arrive at the speed at which certain phenomena were progressing.

If the ship's log be asked for, the captain and officers will be saved all the trouble and liability to mistake which are entailed in copying. So that a ship's log kept by a man who was forewarned by an advertisement that we were going to borrow it, and asked to make any slight additions to his ordinary observations if they did not cover our requirements (such as taking a few readings of his barometer when in port, more especially if he had only an aneroid, so that we might get a rough correction for it from the neighbouring land observations), would furnish the best data we could have.

There are, however, sometimes difficulties in getting ships logs, as they cannot always be lent; so that it would be well to draw up a form for circulation asking for the observations required, if the log cannot be spared.

As to the number of observations required each day on a form, much depends on whether the Council wish to produce a daily chart for a given *Greenwich* time or a given *local* time.

If Greenwich *noon* be needed, we could not ask for fewer than two daily, between which we could interpolate for the Greenwich time. For all positions between Greenwich and 60° W. Greenwich noon would lie between 8 a.m. and noon of local time, so that these hours would be the best to ask for; and if we could get 10 a.m. also, it would come in very useful, especially in the middle of the Atlantic.

If only one observation at local time be required, then the noon observation would probably be the best, as the position would be more accurate then than at any other hour. Even supposing the Council should decide to plot only one observation at local time, there would be an advantage in having two or three others in the 24 hours, as I suppose the chief object is to detect the tracks of storms across the Atlantic; and if we had only one observation in 24 hours we should be very likely to miss the time at which a ship experienced a change of wind or barometric minimum; for instance a whole wind-system may have passed over between two noons, in spite of which the wind and barometer may be much the same at each noon.

In any case it would be well, both in our advertisement and on our forms, to ask for remarks showing the time when any important change of wind took place, such as the first of a southerly wind with a falling barometer, and also the lowest reading of the barometer in a gale, the time it occurred, and the direction and force of the wind at that time.

4. "As to the form in which the observations should be furnished, *e.g.*, whether in the ship's or the meteorological log, or on a special form to be supplied by the Office."

That question 4 is chiefly answered by my report on question 3. Ships already keeping a meteorological log for the Office would be requested to continue to do so. Other ships might have our circular stating what is wanted, enclosing a copy of the form and asking them to say on a post card whether they will lend their ship's logs or fill up forms for us. A post card for their answer addressed to the Office might be enclosed.

5. "As to the mode of discussion, and as to the form in which the results of the discussion should be published."

That it would be well to plot the observations on daily charts as they come in, and (if the Council considered them of sufficient value) to publish those charts. Letterpress containing a few remarks would probably be required alluding to cases when severe gales were experienced at hours which are not represented on the charts, but which prove that a certain gale had passed over a given ship.

(Signed) HENRY TOYNBEE,
Marine Superintendent.

January 20, 1882.

Read—The following letter:—

(Translation.)

DEAR SIR, Hamburg, January 13, 1882.

THIS Office would be glad if you could return to it the synoptic charts of the North Atlantic for the month of March 1879 which were lent to you some time ago (Minutes, 1880, p. 83), as it requires them for an investigation it is about to undertake.

At the same time it would be glad to learn if the Meteorological Council were disposed to enter into any arrangement for a joint issue with the Deutsche Seewarte of such synoptic charts in a more complete form, and if so, what proposals the Council would make for carrying out the project.

Yours, &c.

R. H. Scott, Esq., London. (Signed) DR. G. NEUMAYER.

The Secretary was instructed to reply that the Council have at present under consideration a proposal for the preparation of synoptic charts of the North Atlantic for a definite period, and that as soon as the plan is in a more advanced stage, they will communicate with Dr. Neumayer. The charts will be returned shortly.

Read—The following letter (Minutes, December 14):—

M.O. 188. Scottish Meteorological Society,
Albert Buildings, 6, Shandwick Place,
Edinburgh, January 16, 1882.

SIR,

I HAVE the honour to acknowledge receipt of your letter of 5th January, intimating that the Meteorological Council are willing to grant the sum of 100*l.* towards the cost incurred in making the meteorological observations on the top of Ben Nevis and at Fort William during the past summer, for which handsome donation I am directed to return you the best thanks of the Council of this Society.

In reference to your inquiry in connexion with the question of the use of high-level stations, now under consideration at the Meteorological Office, as to whether this Society has any information not likely to be in the possession of your Office, as to the weather in Central Scotland, which could assist the Meteorological Council in forming an opinion on the subject, I beg to inform you that the Council has remitted to Mr. Buchan, their Secretary, the reduction and discussion of the observations made on the top of Ben Nevis in connexion with those made at lower levels in the neighbourhood, particularly as respects their bearings on forecasting the weather, and that as soon as the discussion is completed, the Council will be glad to communicate the results of it to the Meteorological Office. If there be any other point on which the Meteorological Office desire information, the Council will be happy to attend to it; and I am farther to state that should any of the original returns be wanted by the Office, they will be glad to send them.

I am, &c.

R. H. Scott, Esq., (Signed) THOMAS STEVENSON,
Secretary, Meteorological Office, Hon. Sec.
116, Victoria Street, London, S.W.

Mr. Galton stated that Professor Tyndall was desirous of instituting some experiments on nocturnal radiation, and it was resolved that a sum, not exceeding 10*l.*, be placed at Mr. Galton's disposal for experiments to be conducted at Kew on still nights with the view of ascertaining the effect of damp on the comparative readings of thermometers placed on the ground and at a height of 4 feet above it.

Submitted—The following report:—

SIR, Meteorological Office, December 31, 1881.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 31st December 1881.

SEA SURFACE TEMPERATURE CHARTS.

Atlantic Ocean.—The charts for the months of February and August have been completed.

Charts for the months of May and November are in progress; they will be completed during the next month.

I am, &c.

(Signed) C. W. BAILLIE,
Nav. Lieut., R.N.

Capt. H. Toynbee, F.R.A.S., &c.,
Marine Superintendent.

Read—A memorandum from Captain Toynbee reporting that since the last meeting seven logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. H. von Freeden	Brig "W. von Freeden."	April 24—Dec. 31, 1881.	Liverpool, Buenos Ayres, Talcahuano, and home.	1880, p. 122.
Capt. E. Carl V. Heggum.	"Blythswood" -	May 1, 1881—Jan. 4, 1882.	Liverpool, Calcutta -	1881, p. 3.
Capt. Maclear, log kept by Sub-Lieut. C. W de la Poer Beresford.	H.M.S. "Alert"	June 1—Sept. 30, 1881.	Surveying in Torres Straits.	1881, p. 55.
Capt. J. Swan and W. Smith, log kept by H. G. Story, 3rd officer.	"City of Madrid"	March 25—Dec. 28, 1881.	Glasgow, Calcutta, and New York.	1880, p. 128.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted—The following reports :—

January 6, 1882.

STATEMENT of WORK done in the MARINE ROOM during December 1881.

Examined 12 new logs.

Cape of Good Hope District.

Wind Charts.—The percentage of gales recorded in each wind-rose area worked, and charts prepared showing distribution of same in each month.

Revise of large charts for April, May, June, July, August, September, and October received, and March, April, June, and December returned to lithographer.

Revise of index charts received and examined, and distribution of gale percentages and further explanation added. Same sent to lithographer

Current Charts.—Revise of index charts received and examined.

Letterpress.—Reading revise of ordinary and Cape Gale letterpress, and preparation of various matter for same.

The staff of the room engaged almost entirely upon Atlantic sea temperature.

CHARLES HARDING.
HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq.

December 31, 1881.

STATEMENT of WORK done in the PANTAGRAPH ROOM during December 1881.

Copper Plates pantagraphed :—3 plates, Nos. 7 to 9, 1877.

Zinc Plates.—Barograms, 5 plates, Nos. 11 to 15, 1877; Thermograms, 6 plates, Nos. 11 to 16, 1877; Vapour tension, 5 plates, Nos. 8 to 12, 1877; Anemograms, 9 plates, Nos. 15 to 23, 1877; Rain curves, 5 plates, Nos. 7 to 11, 1877.

Photographic Curves are prepared for pantagraphing to Plate 21 for barograms, and Plate 18 for thermograms.

The zero points of the new barogram scale-values have been checked for six observatories.

R. H. Scott, Esq., F.R.S.

R. H. CURTIS.

STATEMENT of WORK done in the EXAMINATION ROOM during the Month of December 1881.

SIR,

January 2, 1882.

THE following curves and tabulations have been examined :—June : *Thermograms*, five stations ; *Barograms*, two stations.

November : *Thermograms*, two stations ; *Barograms*, one station ; *Anemograms*, two stations.

The very indifferent photography, bad work, and the late exceptionally stormy weather, in addition to my absence from office for *five* days and Mr. Aldridge for *four*, have somewhat retarded the progress of the examinations.

I am, &c.
T. E. ALLEN.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary, Meteorological Council.

Submitted—A specimen of the new "Boletim Meteorologico," published at Lisbon.

Reported—That the following cheques for December were drawn on the 31st of that month:—

	£	s.	d.	£	s.	d.
Administration:						
R. H. Scott, salary	-		-	66	13	4
J. S. Harding, jun.	27	15	6			
T. D. Bell } Salaries and wages	13	6	8			
J. S. Harding, sen.	*11	4	7			
				52	6	9
G. A Gillett, wood, &c.	-		-	1	8	6
C. W. Jacques, rent, No. 116	133	13	0			
„ „ No. 113	18	0	6			
				151	13	6
F. Hatchett, compo-litho plates	-		-	2	4	0
Pickford & Co., carriage of parcels	-		-	0	15	9
Williams and Norgate, books	-		-	3	9	9
Special Researches:						
C. E. Strachan, Arctic work	-		-	3	3	0
W. Thomas, care of Scilly anemometer	-		-	1	13	8
H. Williams, care of "Bridled" anemometer	-		-	1	6	0
Land Meteorology:						
C. Niven, Aberdeen	-		-	63	16	0
T. R. Robinson, Armagh	46	19	0			
„ „ (expenses)	8	12	0			
				55	11	0
W. L. Fox, Falmouth	-		-	72	17	0
R. Grant, Glasgow	-		-	58	8	4
H. Williams, Holyhead	-		-	2	15	6
G. M. Whipple, Kew	-		-	100	0	0
C. Clouston, Orkney	-		-	2	19	3
G. H. Aird, Seaham	-		-	2	13	10
S. J. Perry, Stonyhurst	-		-	57	1	5
J. E. Cullum, Valencia	16	13	4			
„ „ (expenses)	42	10	0			
				59	3	4
G. T. Watson, Yarmouth	-		-	4	17	11
P. Adie, ivory scales	-		-	1	11	6
J. J. Hicks, alterations to rain gauge	-		-	2	3	6
J. O'Driscoll, rent at Valencia	-		-	25	0	6
A. J. Rigby, conversion tables	-		-	4	2	10
R. H. Curtis	22	4	5			
J. A. Curtis	15	11	1			
T. E. Allen } Discussion, &c. of observations	15	11	1			
C. H. Thompson	*11	10	0			
E. G. Aldridge	*9	3	4			
				73	19	11
Weather Information and Forecasts:						
J. McCormack, Aberdeen	-		-	3	3	0
J. W. Mayes, Ardrossan	-		-	1	1	6
Postmaster, Bundoran	-		-	1	8	0
H. Todd, Cambridge	4	16	10			
„ (bonus)	3	3	0			
				7	19	10
Postmaster, Cliffony	-		-	1	1	0
H. Mohn, Christiania	-		-	5	10	0
T. MacGowan, Donaghadee	0	14	0			
„ „ (bonus)	3	3	0			
				3	17	0
Carried forward	-		-	£895	16	5

* Five weeks ending 31st December.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	895	16	5
Weather Information and Forecasts—*cont.*						
J. Costello, Dover - - - -	3	18	6			
„ (bonus) - - -	3	3	0			
				7	1	6
W. Brand, Dunrossness - - -	3	7	6			
„ „ (bonus) - -	3	3	0			
				6	10	6
Postmaster, Dunrossness - - -	-		-	0	18	3
„ Enniskillen - - -	-		-	1	1	0
W. Foster, Hawes Junction - - -	-		-	3	18	3
J. Tilston, Holyhead - - - -	5	0	2			
„ „ (bonus) - - -	3	3	0			
				8	3	2
G. G. Appleton, Hurst Castle - - -	4	0	10			
„ „ (bonus) - -	3	3	0			
				7	3	10
Postmaster, Inverness - - - -	-		-	1	6	0
J. Fisher, Jersey - - - -	4	2	6			
„ (bonus) - - -	3	3	0			
				7	5	6
Postmaster, Killarney - - - -	-		-	1	1	0
J. Hutchison, Leith - - - -	0	13	0			
„ „ (bonus) - - -	3	3	0			
				3	16	0
F. Gaster, London - - - -	3	18	0			
„ (bonus) - - -	3	3	0			
				7	1	0
K. Kerr, Mullaghmore - - -	4	0	8			
„ „ (bonus)- - -	3	3	5			
W. Conway „ - - - -	5	17	7			
				13	1	8
W. D. Penny, Nairn - - - -	4	4	6			
„ „ (bonus) - - -	3	3	0			
				7	7	6
M. Mackintosh, Nairn - - - -	-		-	0	13	0
J. W. Irvine, North Shields - - -	-		-	3	3	0
E. J. Lowe, Nottingham - - -	-		-	3	18	0
W. Wickham, Oxford - - - -	-		-	3	12	4
G. Phillips, Parsonstown - - -	-		-	3	7	8
J. John, Prawle Point - - - -	3	5	0			
„ „ (bonus) - -	3	3	0			
				6	8	0
W. Kennedy, Roche's Point - - -	0	7	0			
„ „ (bonus) - -	3	3	0			
				3	10	0
S. Blake, St. Ann's Head - - -	4	1	6			
„ „ (bonus) - -	3	3	0			
				7	4	6
W. Thomas, Scilly - - - -	5	7	0			
„ (bonus) - - -	3	3	0			
				8	10	0
J. B. Smith, Spurn Head - - -	-		-	3	15	6
J. Sutherland, Stornoway - - -	5	12	2			
„ „ (bonus) - -	2	2	0			
				7	14	0
Postmaster, Stornoway - - -	-		-	1	6	0
„ Valencia - - - -	-		-	0	14	0
J. Sinclair, Wick - - - -	3	5	0			
„ „ (bonus) - - -	3	3	0			
				6	8	0
Carried forward -	-		-	£1,031	15	7

	£	s.	d.	£	s.	d.
Brought forward -	-		-	1,031	15	7
Weather Information and Forecasts—*cont.*						
J. Murray, Wick - - - -	-		-	1	6	0
G. T. Watson, Yarmouth - - -	4	8	10			
„ „ (bonus) - -	3	3	0			
				7	11	10
A. Guy, York - - - - -	-		-	3	18	0
Postmaster General, telegrams - - -	-		-	179	4	3
F. Gaster - }	29	1	6			
W. L. Dallas - } Preparation, &c. of Weather	20	12	1			
F. Brodie - } Reports.	19	15	1			
G. G. Francis - }	18	3	4			
				87	12	0
Inspections:						
A. Buchan, salary - - - - -	-		-	37	10	0
W. C. Ley, „ - - - - -	-		-	37	10	0
Ocean Meteorology:						
Captain H. Toynbee - }	*83	6	8			
R. Strachan - - } Discussion, &c. of observations, and care of instruments.	27	15	6			
C. Harding - - }	22	4	5			
H. Harries - - }	†14	0	0			
Nav. Lieut. C. W. Baillie, R.N. }	16	13	4			
				163	19	11
Peninsular and Oriental Steam Navigation Company, freight -				0	12	6
P. Adie, repairing "A" barometers - -	6	5	6			
„ „ "B. T." „ - -	7	19	0			
				14	4	6
R. Riviere and Son, labels for presentation charts	-		-	1	1	0
J. H. Woodstock, packing cases - -	-		-	2	6	0
Miscellaneous:						
J. S. Harding, junr., petty cash - -	100	0	0			
„ „ - -	50	0	0			
				150	0	0
Total -				£1,718	11	7

* Addition of 50*l.*, being one and a half month's salary in lieu of vacation (Minutes, 29th October 1880).
† Five weeks ending 31st December.

116, *Victoria Street, February* 3, 1882.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (January 20) were read and confirmed.

Applications for the appointment of Assistant in the Meteorological Office, Calcutta (Minutes, January 20), from the following gentlemen, were read:—

Mr. Lawrance (211), Mr. Dallas (212), Mr. C. Harding (213), Mr. Harries (214), and Mr. Allingham (215).

Mr. C. Harding having withdrawn his application, the Council resolved to recommend Mr. Dallas for nomination to the post.

Read—Letter 236 from the War Office, stating that the information relating to sea disturbance round the coasts, which could be supplied by the Office (Letter 129), would not now be required.

Read—The following letter:—

DEAR MR. GALTON, Elswick Works, Newcastle-upon-Tyne, February 2, 1882.

IN accordance with your request I send a report upon the experiments I have made as to a smoke-cloud produced by the bursting of a shell.

The gun I used was a light 7-pr. of 400 lb. weight, and it was mounted at an angle of 75°, on the plan shown on the enclosed tracing, No. 11,236. I considered that 75° was the highest angle that could be used consistently with safety to those using the gun, in the event of a premature explosion.

The object of the first experiments was to ascertain at what heights the shell could be distinctly seen to burst, and at what rate the fuzes would burn when in strata of air so much less dense than those in which they are usually fired. There were also some technical points connected with the description of fuze to be used, but with these perhaps I need not trouble you.

The first round was fired with our small pattern time fuze set to 1 inch in length. The shell burst in 2¼ seconds and was clearly perceptible. The height of this burst may be roughly estimated at about 2,500 feet. The second round, in which the same fuze was set to 2 inches, and which burst at 5·35 seconds was also distinctly visible, but the third, fourth, fifth, and sixth rounds although they burst and their bursts were seen, were not observed at the moment of burst, so that the time of flight could not be noted. At this time the sky, which had previously been fairly clear, was clouded; in consequence practice was stopped until later in the day, when the sky was clear and the bursting of the shell could be seen with certainty. On re-commencing with the seventh round the medium pattern fuze was tried, the fuze being set to 4 inches. The time to the burst was 9·75 seconds. In the next, the eighth round, the moment of the burst was not caught. In the ninth round an experiment was made to see whether the large pattern fuze, which would give a longer time of burning, could be safely fired in so small a gun. This fuze was, however, blind, as it was feared it would be, and the shell did not burst. The tenth round, which was set to 4½ inches, burst properly, but the moment of bursting was not observed.

In these experiments an attempt was made to obtain the heights of the bursts by means of two observers taking the angle at the moment of the burst, but the great difficulty of making the two observations simultaneous caused this attempt to be a failure.

The experiments were resumed on the 5th January, the same gun and arrangements being employed. The attempt to measure the height by two angles was abandoned, and the height was determined by noting the time between the burst and the report, and taking the angle of elevation of the burst from the gun. On this occasion eight rounds were fired, the whole with medium fuzes, except when in rounds four and five a second attempt was made to use the large pattern fuze, but as before, both fuzes were blind. In the other rounds the medium fuzes were set at 4·8 inches. The times of burst varied between 13·6 and 14 seconds. Three very good observations were made of the time taken by the sound to return to the gun. These times were 9·7, 9·8, and 9·8 seconds. The angle above the horizon of the burst was in all three cases as nearly as possible 62°. Assuming the velocity of sound at 1,090 feet, the above data give the height of burst at 9,450 feet. The day was exceedingly windy, but the sky very clear. A cloud of smoke could be seen without difficulty for a considerable time, but I should anticipate great difficulty in seeing it on a dull leaden sky.

There would be no difficulty with a larger gun in sending shell very much higher, but the expense would be very much greater.

Faithfully yours,

Francis Galton, Esq., F.R.S. (Signed) A. NOBLE.

The Secretary was instructed to inquire from Captain Noble whether it would be possible to have a series of observations made with the gun at Shoeburyness; and if so, whether an attempt could now be made to determine, at the time when each round is fired, the direction and velocity of the upper wind by observation of the bursting of the shell, and of the subsequent course of the smoke: the direction and velocity of the wind at the surface being recorded at the same time.

The Secretary was further instructed to inform Captain Noble that the Council would be willing to increase the amount of the grant placed at his disposal.

It was suggested that the effect of magnesium and other stars in the shell might be tried, with the view of increasing the visibility of the smoke.

Mr. Galton reported that observations of nocturnal radiation, in furtherance of Professor Tyndall's wishes, had been organised and commenced at Kew Observatory (Minutes, January 20). A light portable stand had been constructed, consisting of a thin iron rod 4 feet high, rising vertically from one side of an horizontal iron hoop, that was laid on the ground and served as a base. Two horizontal arms proceeded from the vertical rod; one to the front, 4 feet above the hoop, the other to the back, 2 feet above the ground. Some wool, for which it is proposed to substitute swans-down, was laid within the hoop. One thermometer was laid on the wool, a second thermometer was fixed to the upper horizontal arm parallel to and 4 feet directly above it. A wet and a dry bulb thermometer were attached to the second arm, 2 feet above the ground. Towards nightfall the apparatus was carried into the open park, and the thermometers were read off at frequent intervals during 1½ hour. Two sets of observations had already been taken and forwarded to Professor Tyndall.

Mr. Galton read letters from Professor Tyndall, in which he stated that the results already obtained were of the highest interest to him, at the same time strongly urging their continuance and extension, and also making certain suggestions, which had been communicated to Mr. Whipple.

Read—An application from the Kew Committee (Letter 257) for a grant of 5*l.* (Minutes, 1881, p. 128) for the reduction of the Kew electrograms for another year. Approved.

Read—A memorandum from Captain Toynbee reporting that since the last meeting three logs had been received, two of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. W. Kidley	S.S. "Gaelic" -	April 19—Sept. 27, 1881.	San Francisco to Yokohama and Hong Kong.	—
Capt. W. H. Smith, R.N.R.	S.S. "Circassian"	Feb. 26—Aug. 7, 1881.	Moville to Halifax, &c. Four voyages.	1880, p. 78.

Mr. Scott was instructed to present the charts (O. 27) to Captain Kidley, and to convey the best thanks of the Council to Captain Smith.

The subject of the proposed synoptic discussion of Atlantic Weather for one year (Minutes, January 20) was further considered, and the following memorandum was read:—

TRANSLATION of an EXTRACT from ARCHIV DER DEUTSCHEN SEEWARTE.
III Jahrgang, 1880, No. iii., p. 2.

IT still remains to us to justify, in a few words, the choice of the adoption of *local* time for the synoptic charts, in opposition to the increasing demand for the introduction of absolute simultaneity in the observations, or the nearest possible approach thereto. The object of synoptic charts is undoubtedly to represent the connection between, and the mutual influence of, *simultaneous* conditions. But the departures from simultaneity caused by the use of local time are less at the place where this connection is the closest, *i.e.*, between adjacent stations, and only attain importance at greater distances, where the connection is necessarily much more remote. The corrections which are required in many cases on account of these departures; *e.g.* with reference to the motion of centres of depressions, can in general be accurately calculated, and the charts themselves are not materially distorted anywhere by the adoption of local time. Gradients, running along parallels of latitude, are certainly somewhat influenced by differences of pressure, produced by the use of local time, as, with a falling barometer, gradients to the W., and, with a rising barometer those to the E., become somewhat too great, but this influence is only worth notice where the changes of pressure are

very sudden, and, at the same time, the gradients are slight, conditions which seldom occur together; during moderate or strong winds they do not exceed in the most unfavourable cases 5 per cent. of the magnitude of the gradient. Against these drawbacks there are two important advantages in the use of local time :—(1) the restriction of the influence of daily range, and (2) the possibility of getting more abundant and, for the occasion, more accurate observations. The diurnal range, to which all meteorological elements are subject, cannot be placed on a par with the much greater non-periodic variations, as its effect in synoptic meteorology is much restricted, owing to its short duration and its preponderating restriction to the lowest stratum of air. The masking of the effects of the daily range, in the general geographical picture of the state of the weather, complicates meteorological phenomena—which as it is, are difficult enough to study—to an extent which, until we attain a considerably higher stage in weather knowledge than has at present been reached, would make it highly desirable to avoid such a complication. The second of the above-named circumstances (the number of observations) is of more importance. In order to carry out a meteorological investigation on a sure basis, we require not only numerous stations, but observations at short intervals apart, at most of from 6 to 12 hours, as experience shows. If then the now generally adopted single simultaneous observation could without considerable difficulty be taken at a much greater number of places, still it is certainly impossible to obtain three or four simultaneous observations per diem from a corresponding number of places on all meridians for a long time to come. On land people must sleep; at sea the division of the watches, which are always kept according to local time, and the constant change of simultaneous time with respect to this division of watches, offer insuperable barriers to the adoption of such a simultaneous system. It was the strict adherence to this general international division of the day's service which rendered possible the realisation of the grand system of observation which existed, or exists, on the American, English, Dutch, and German mercantile navies, and which is rapidly increasing in the latter; whereby the possibility of solving the most important questions increases from day to day. If we demand simultaneous observations, then a serious double retrograde step is unavoidable, we diminish the number of observers and in many cases we diminish confidence in the observations, especially with reference to keeping to the time of observation, for it is, of course, much easier to make and enter the observation, as usual, at the end of the watch, than at varying times during the watch, according to the indications of a chronometer, to which the officer of the watch has no access.

In another place (Zeitschrift, vol. xv., pp. 201–2) we have already said that the progress of weather telegraphy would sooner or later imperatively demand the introduction of simultaneity in each field of research, and, therefore will make this very desirable also for scientific study in the domain of synoptic meteorology. But until this demand of practical weather telegraphy has come about, the science has, in our opinion, no reason to strive after absolute simultaneity, and so to sacrifice the much greater advantages offered by observations according to similar local time.

DR. W. KÖPPEN.

Read—The following Reports :—

M.O. 187.

DEAR SIR,

I HAVE the honour to submit to the attention of the Council the following report of the stations inspected by me in the year 1881.

TELEGRAPHIC REPORTING STATIONS.

London (*Brixton*) (visited June 1st).—I found everything at this station, as usual, in excellent order.

Yarmouth (visited June 2nd and 3rd).—The reporting barometer reads ·007 in. too low, and the check barometer as much as ·009 in. too high. The minimum thermometer reads too low. The instruments were found to be not very clean. The rain-gauge was not quite firm or level; this was rectified; but the instrument has an indifferent exposure.

Scilly (*St. Mary's*).—I took to this station, on June 16, two new barometers with uncontracted tubes, 597 and 598; but on the following day, an injury having been done to my standard by some one in the hotel, I was under the necessity of taking one of them (597) with me as a standard. The old barometer (which I have for the present left in its place at the station) this year, as on previous occasions, read too high. The new reporting barometer (598) read ·015 in. too low as compared with my old standard, and ·007 in. lower than the instrument which I have since adopted as a standard. The anemometer worked well, and the other instruments were found to be in good order, but the wet bulb and maximum thermometers read high.

Prawle Point (inspected June 20th).—Two new barometers (585 and 586) had been sent to this station since my visit of last year. The instruments were all in admirable order. The observer, Mr. J. Johns, had been in the habit of setting the vernier too low, producing a mean error of —·005 in., but this, I think, will not again occur.

Hurst Point (visited June 22nd).—Being in possession of a barometer with uncontracted tube for comparison, and the weather being less squally than on the occasion of my last year's visit, the examination of the new barometers at this station was made under favourable circumstances. As a result I recommended the substitution of the check barometer 565 for the previous reporting barometer 566, which I found to read low as compared with both my standards. The observer had been in the habit of setting the vernier too low, producing an error of about —·005 in. He has also, I think, at times over-estimated the force of the wind.

From inquiries, as well as observation, I think that the sea disturbance visible at Hurst commonly represents the disturbance beyond the Needles rather inadequately.

The mean angle of deviation in all instances of northward and north-eastward gradients is so abnormally great at this station, that I may be permitted to express my opinion that in these instances the report from Hurst should not be employed for the arrow on the daily weather maps. The extreme deviation appears to be very local.

Jersey (*Noirmont*) (visited June 24th).—The instruments were all in very good order. The observer now sets the vernier correctly, but the barometers could be read with far greater facility if they were provided with short in place of the long arms. In accordance with the observer's wishes, I marked out a new site for the out-door instruments, 19 yards south of their previous position. The exposure in their new site is perfect, and the altitude is the same, to within 2 or 3 inches, as before. A vane has been erected and works freely.

Spurn Head (inspected August 10th).—Everything in perfect order at this admirably exposed station. The only drawback here is the almost perpetual drifting of the sand which very frequently coats the wet bulb, and at times chokes the rain-gauge.

York (August 17th).—The instruments were in good order, but the barometer reads slightly too low. There has been no improvement in the work at this station since the resignation of Mr. Purvis and the appointment of Mr. Keeping.

North Shields (visited August 18th).—The instruments were in fairly good order with the exception of the rain-gauge, which on the day of my arrival was found to leak seriously. I took the instrument to a gasfitter, who undertook to repair it the same day. A new rain-gauge has, however, been sent to the station for temporary use.

The greatness of the mean angle of deviation, except with the south-westward gradients at this station, makes a remark similar to that which I have made on the Hurst observations applicable to those at Shields. The abnormally large deviation is local, and an arrow showing the wind at Shields points most commonly as much as two points of the compass to the right of an arrow representing the wind prevailing over district 2 (England N.E.).

Hawes Junction (August 20th).—The instruments were in excellent order. A new observer, Mr. W. Foster, has been at this station since July 1st. At the time of my visit he read the instruments slowly, but correctly.

If the altitude of this station above mean sea level, as previously determined, be assumed to be correct, the barometric pressures reported have been, on the average, about ·01 in. lower than they should be, as reduced to sea level by the usual tables. The variations, however, between the pressures at this station, thus reduced, and the hypothetical pressures calculated from the reports of the neighbouring stations, are of greater amplitude than I should have anticipated.

Barrow-in-Furness (visited August 21st).—The reporting barometer at this station read, on the average, as much as ·038 in. higher than the barometer (597) which I employed as a standard, and 051 in. higher than a good Fortin (1149).

The thermometer screen has been slightly shifted since my visit in 1880. Its position is not quite satisfactory.

I still consider that the observations of sea disturbance made at this station must be supplemented by a large element of conjecture.

The mean angle of deviation of the winds at Barrow-in-Furness is, especially with westward and south-westward gradients, remarkably small. Whether this phenomenon is purely local, or extends over any considerable portion of the Lancashire or Cumberland coast I do not at present know. As far as I can learn, it is noticeable at all hours and seasons. The reports from the station appear to be made with much care and accuracy.

The following table shows the differences between the readings of the barometers and thermometers at the above stations and the readings of the inspector's standards, the former being uncorrected, and the latter corrected for index errors. In the barometric comparisons corrections have been applied, where necessary, for differences in the temperature of the mercury, and for differences of level of the cisterns. In the thermometric comparisons the instruments have all been compared in water, with the necessary precautions. Several comparisons were usually made, and the mean result recorded.

Station.	Barometers.			Thermometers.				
	Height of Mercury.	Reporting.	Check.	Temp. of Water.	Dry Bulb.	Wet Bulb.	Max.	Min.
Barrow - -	29·74	+·038	−·013	60°	+0°·2	+0°·2	0°·0	−0°·1
Hawes Junction -	28·67	−·005	*	51°	−0°·1	+0°·2	−0°·1	−0°·2
Hurst Castle -	29·84	−·016	+·002	58°	+0°·1	+0°·2	+0°·1	−0°·3
Jersey - -	30·09	+·007	+·006	58°	+0°·2	+0°·3	+0°·1	−0°·1
London - -	30·19	+·003	*	64°	+0°·2	−0°·1	−0°·1	−0°·1
Prawle - -	29·42	·000	−·002	56°	+0°·2	0°·0	0°·0	−0°·3
Scilly - -	29·75	−·007	+·011	58°	+0°·3	+0°·4	+0°·5	−0°·1
Shields - -	29·63	−·006	−·001	59°	0°·0	+0°·1	−0°·2	−0°·3
Spurn - -	29·61	−·002	−·004	60°	0°·0	0°·0	0°·0	0°·0
Yarmouth - -	30·21	−·007	+·009	62°	+0°·2	0°·0	+0°·1	−0°·6
York - -	29·39	−·006	*	59°	+0°·1	+0°·1	+0°·1	−0°·8

STATIONS furnishing MONTHLY and WEEKLY REPORTS.

Geldeston (visited June 2nd).—No change has been made in the position of the instruments, except that the rain-gauge has been shifted, and the Stevenson's screen turned round, in accordance with previous advice. The sunshine recorder has a very fair exposure, being sheltered, I think, for only 32 hours (approximately) of possible sunshine in the year. The barometer reads correctly, and the other instruments were found to be in good order. The returns from this station are very full and accurate, and the observer is greatly interested in his work.

Chigwell Row (visited June 6th).—The observations are conducted with a fair amount of accuracy. Since my previous visit a margin of turf has been laid down round the screen, but of inadequate dimensions. The barometer gave correct readings. The minimum thermometer, though containing no spirit in the upper end, had, when the Kew corrections had been applied, a rather large *minus* error.

Cooper's Hill (visited June 7th).—The out-door instruments at this station are well exposed, and were found to be in good order. The black bulb *in vacuo* reads correctly at 55° as compared with my standard, and also read correctly when the last comparison was made in February 1879; but, according to the correction of the Kew certificate, should read 2° too high. The reporting barometer had never been corrected at Kew, but a correction of —·015 in., uniform throughout the scale, had hitherto been applied. Finding, after two comparisons, that with this correction the instrument gave readings which were ·017 in. too low, I recommended that the instrument (which is a very good one) should be sent to Kew. This has since been done.

North winds at this station are said to be deflected so as to blow from N.W., the locality being somewhat sheltered, and the observations reported are those of the movements of low clouds.

It is unfortunately difficult to obtain a full series of 9 p.m. observations at this place.

Plymouth (June 19th).—The observer was absent at the time of my visit. I, however, obtained access to the thermometers, and compared them in water. The maximum reads high. With the growth of the tree on the S.E. of the rain-gauge, the latter becomes more and more seriously sheltered.

Totnes (visited June 20th).—The instruments at this new station were in excellent order, and the observer seems to be careful and attentive. The rain-gauge is slightly sheltered on the N.E. The surrounding country is wooded and broken, and I should expect westerly winds to be deflected, so as, perhaps, to blow from W.N.W.

Jersey, St. Aubin's.—I visited this admirably conducted station on June 24th, and found everything in perfect order.

Leicester (August 10th).—The instruments were found to be in a tolerably satisfactory state. The grass minimum has, at 60° a serious error of +1°·1. The observer in reading the barometer made a nearly uniform error of —·004 in., which arose from his wrong adjustment of the fiducial point.

At *Hull*, the observer and his family being absent from home at the time of my visit (August 17th), I was not able to examine the instruments.

York (visited August 17th).—The reports from this station show no improvement, the meteorological observations being still left in the hands of the gardener of the Museum grounds, who is not able to make the reductions correctly, and has an apparently incurable habit of reading the thermometers somewhat incorrectly.

Durham (visited August 17th).—No change of any kind had been made since my last visit. The instruments were in fairly good order, but the work is carried on in a negligent manner, so far as punctuality in sending in the returns is concerned.

Seaham Harbour.—At the time of my visit, August 18th, the instruments were found in better order than on previous occasions, as regards care on the part of the observer; but the errors of the thermometers are considerable. The barometer, which has an inconvenient site, is rather roughly read by Mr. Aird.

Aysgarth (August 19th).—This station is situated on a small hill sloping to Bishop Dale on the S.E., with moorland rising to between 900 and 1,000 feet above the level of the station, about three miles to S.E. A little behind the house and garden the hill slopes down to the Ure, above which, on the N.W., rises moderately high moorland. To the E.N.E. the valley is comparatively wide. The winds are therefore likely to be considerably affected by the hilly ground; and the extremes of temperature, especially the minima, are not likely to be quite so great as those experienced in the lowest parts of up-land valleys like that of the Ure in this district. The barometer reads correctly. The thermometers used for the reports are in a modified form of Stevenson's screen, large, and zinc-louvred. The observer informs me that the instruments in this screen read, when there is hot sunshine, from 0°·3 to 0°·5 *lower* than in the usual Stevenson pattern, one of which stands close to the observer's screen. After numerous comparisons of many thermometers, I recommended the substitution of another dry bulb as the observer's standard, in place of the one previously used, the Kew corrections of the latter not being now reliable. The dry bulb mentioned below in the thermometer table is the one adopted since my visit. A small (5-inch) rain-gauge had hitherto been employed. This, with the observer's advice and approval, I exchanged for a large gauge, and further altered the position about 9 yards, on account of some trees on the N.W.

It is needless to say that the work at this station is admirably conducted.

Prestwich (visited August 23rd).—The out-door instruments at this station have a good exposure. Unfortunately, there is little likelihood of getting satisfactory records from the present observer. The manager (Mr. Lay) was, and frequently is for months together, absent, and Dr. Sankey, who is in charge of the observations, practically leaves the records to be filled up by the patients in the

asylum, to whose incapacity the ambiguities in the entries may be attributed. I did all that I could to obtain more attention to the work, but am not sanguine as to the result. The barometer at 29·35 had a large error, +·032.

Sheffield (visited August 24th).—The observer was absent at the time of my visit, and his best rain gauge and maximum and minimum thermometers were locked up. I think that the bad exposure of the instruments is such that the reports, affording only a very rough representation of the climate of Sheffield, are not worth publishing. The barometer read correctly. I failed to dismount the dry and wet bulbs, which were rusted in.

The following table gives the errors of the thermometers as compared with my standard, both *without* and (where any could be obtained from the observers) *with* the corrections previously applied to them. Where these latter corrections have been obtained directly from the Kew certificates the errors entered are marked with an asterisk. All the comparisons were made in water.

THERMOMETER TABLE (Stations furnishing Monthly and Weekly Reports).

—	Dry Bulb.		Wet Bulb.		Maximum.		Minimum.		Solar Radiation.		Grass Minimum.	
	Uncor.	Cor.	Uncor.	Cor.	Uncor.	Cor.	Uncor.	Cor.	Uncor.	Cor.	Uncor.	Cor.
Aysgarth	0°·0	0°·0*	+0°·3	+0°·1*	+0°·1	0°·0*	−0°·4	−0°·4*	—	—	—	—
Beccles (Geldeston)	+0°·2	+0°·2*	+0°·3	+0°·2*	+0°·2	−0°·1*	−0°·1	−0°·3*	−0°·1	—	—	—
Chigwell Row	+0°·1	−0°·2*	+0°·2	0°·0*	−0°·1	−0°·1*	−1°·0	−0°·7*	—	—	—	—
Cooper's Hill	0°·0	−0°·1	0°·0	−0°·2	+0°·1	+0°·3	−0°·1	+0°·1	+0°·1	−0°·1	+0°·2	+0°·2
Durham	+0°·1	+0°·1	+0°·1	+0°·1	0°·0	+0°·1	−0°·4	+0°·1	−0°·1	—	−0°·1	+0°·1
Jersey (St. Aubin's)	0°·0	—	0°·0	—	0°·0	—	−0°·2	—	—	—	+0°·1	—
Leicester	0°·0	—	+0°·2	—	+0°·1	—	0°·0	—	+0°·1	—	+1°·1	—
Plymouth	+0°·1	—	+0°·1	—	+0°·5	—	−0°·4	—	—	—	—	—
Prestwich	0°·0	−0°·2*	+0°·3	+0°·1*	+0°·3	−0°·1*	+0°·1	−0°·1*	—	—	0°·0	—
Totnes	+0°·2	0°·0*	+0°·3	+0°·1*	−0°·2	−0°·2*	0°·0	+0°·1*	—	—	−0°·4	−0°·3*
Seaham	+0°·6	—	+0°·5	—	−0°·4	—	+0°·1	—	—	—	—	—
York	+0°·1	—	+0°·1	—	0°·0	—	−0°·2	—	—	—	—	—

The table shows (for the most part) what I regard as a remarkable agreement in the readings of the instruments.

In September, when just about to finish the work of inspection, I was seized with a very prolonged and dangerous illness, from which I am only now convalescent. Several stations, the inspection of which was of immediate importance, were visited during my illness by Mr. Scott and by Mr. Gaster.

The uncontracted barometer, M.O. 597, which as previously mentioned, I have hitherto retained, I intend to take to its original destination, Scilly, in the early spring, and I shall be grateful if I may then be supplied with a similar instrument as a standard. At many of the most important stations the reporting barometers are now of this pattern, and in squally weather it is impossible fairly to test these instruments by one of a more sluggish nature. In such weather I can employ the old standard (which I have repaired), at the stations where the barometers have contracted tubes. As regards carriage, in careful hands (and an instrument to be used as a standard should pass into no other), the one class of barometer is as convenient, or inconvenient, as the other.

Yours faithfully,

To the Secretary of the Meteorological Council. W. CLEMENT LEY.

I HAVE the honour to report that I visited the telegraphic reporting station of *Cambridge* on the 21st of November last.

I found the instruments in good order, and have no fault to find with the general condition of the station.

St. Leonard's was visited November 28. This is a station of the Second Order and the observer is Dr. H. Colborne, F.M.S. He is a most careful and competent person for the place. The time of my visit was unfortunate, for the thermometer screen had been blown down and the minimum instrument broken by the gale of November 26th.

The garden is rather small, but in other respects the exposure is as good as can be usually obtained in a town.

The following are the errors of the thermometer as determined by me:—

	Cambridge.	St. Leonard's.
	°	°
Dry	+0·4	+0·3
Wet	+0·3	+0·3
Maximum	−0·1	+0·5
Minimum	−0·3	
Grass Minimum	—	−0·6

ROBERT H. SCOTT.

February 3, 1882.

Inspection Report, 1881.

Sir, Meteorological Office, February 3, 1882.

In accordance with your instructions, I inspected the following stations in December last:—

1. *Stations of Second Order.*

Oscott.—Observer, Rev. J. MacElmail, St. Mary's. When I arrived the observer was out, and did not return until after dark, when the instruments were examined as carefully as they could be under the circumstances. The barometer is a Fortin's Standard, and a very good instrument. It is not in a good light, but a lighted taper is always used when observing. The vernier is properly set, and the corrections are carefully applied. There was no opportunity for comparing the instrument with the one I had with me as a standard, but it has been carefully verified at Kew.

Thermometers (compared in air) agreed well together, and with the Inspector's standard. The dry, wet, maximum, and minimum are in a *Stowe's* stand (somewhat similar in principle to a Stevenson), and are, as a rule, carefully read. I was able to detect the cause of some errors observed by Mr. Curtis in the monthly returns: the observer having been in the habit of putting his lamp into the screen *after* reading the instruments, but before *setting* them. This caused the thermometers to rise, and the consequence was that when *set* they were set to a false reading, which occasionally affected the value entered on the following day.

Rain-gauge is a 5-inch gauge, and its rim is 1 foot from the ground.

The instruments are admirably exposed; and (except in regard to the temperature) the observer appears to be very intelligent and painstaking.

The observer wished me to say that from the beginning of August to the end of September in each year he is away from the College; and that at the end of July 1883 he is likely to leave permanently.

Uppingham.—Observer, Rev. G. H. Mullins. This station is very well exposed. The whole of the instruments are good; they are most carefully read and corrected, and the observer enters into the spirit of his work with a zeal and intelligence quite exceptional. He fears, however, that some 18 months hence he may be obliged to give up part of his garden to the ground landlord, and should this be so, the position of the instruments would not be at all good.

Telegraphic Reporting Stations.

Dover.—Observer, J. Costello.

The positions of the instruments at this station are still bad throughout; and although I believe that the observer most conscientiously does what he believes to be right, his duties prevent his seeing very much of the changes which occur from time to time, and the position of the rain-gauge (on the roof of the South-Eastern Railway Station) is such that he does not even pretend to examine it daily, but only when he knows that there has been an appreciable fall of rain. The thermometers in their present position cannot record at all accurately the diurnal range of temperature, and the station is completely sheltered from winds blowing from between W., round by N., to E.N.E.

I think that, if possible, some endeavour should be made to remedy these defects.

I am, &c.

(Signed) Fredc. Gaster.

Barometers.

Stations.	Reporting Barometer.		Standard.		Notes.
	Barometer.	Attached Thermometer.	Barometer	Attached Thermometer.	
Oscott (St. Mary's College) -	29·377	49	—	—	No facility for mounting standard.
Uppingham - - -	29·112	51	29·119	51	Reporting barometer had a contracted tube; standard uncontracted.
Dover (S. E. Railway Station) -	30·293	48	30·302	49	The standard was left at Dover to be used as a "check" barometer.

Thermometers.

Instruments.	Errors of Thermometers.			Notes.
	Oscott.	Uppingham.	Dover.	
Inspector's standard (corrected) -	35°·3	45°·9	43°·2	The instruments at Oscott were verified in air; those at Uppingham and Dover in water.
Dry bulb - - - -	+ 0 3	0·0	0·0	
Wet bulb - - - -	+ 0·3	— 0·1	— 0·2	
Maximum - - - -	+ 0·2	+ 0·4	+ 0·4	
Minimum - - - -	0·0	+ 0·1	— 0·2	
Solar radiation thermometer -	+ 0·5	—	—	
Terrestrial radiation - -	0·0	—	—	

In the above table, the plus (+) sign shows that the instrument read higher than the standard; the minus (—) sign that it read lower.

Submitted—The following reports :—

February 1st, 1882.

STATEMENT of WORK done in MARINE ROOM during January 1882.

Examined 9 new logs.

Cape of Good Hope District.

Wind Charts **for the 12 months sent to press.**
Index Charts **of winds and currents sent to press.**
Specific Gravity, Passage, and Ice Charts **sent to press.**
All charts are now completed and sent to press.
Letterpress.—Appendices sent to press.
Cape Gales.—Received from lithographer proof of Plates I. to V. of January gales; these partly examined. Reading letterpress to accompany January gales.

General.

Plotting Sea Temperatures for the North Atlantic.
Commenced plotting barometer observations for February and August in the North Atlantic.
Preparing charts of Pacific Ocean for barometer work, 16 sheets.
Preparing memorandum, &c., on working Atlantic weather synoptically.
Posting index of data in Ocean 10° squares to date.

(Signed) CHARLES HARDING.
HENRY TOYNBEE,
Marine Superintendent,

R. H. Scott, Esq.

January 31st, 1882.

STATEMENT of WORK done in the PANTAGRAPH ROOM during January 1882.

Copper plates pantagraphed:—8 plates Nos. 10 to 17, 1877; 2 chart plates, Nos. 6 and 7, 1876. A portion of Plates 42 and 43, 1876, re-pantagraphed.
Zinc plates:—Barograms, 6 plates, Nos. 16 to 21, 1877; Thermograms, 13 plates, Nos. 17 to 29, 1877; Vapour Tension, 5 plates, Nos. 13 to 17, 1877; Anemograms, 11 plates, Nos. 24 to 34, 1877; Rain curves, 7 plates, Nos. 12 to 18, 1877.
Photographic curves:—The preparation of the photographic curves is not much in advance of the zinc plates.
A circular on the care of anemometers has been prepared; and measurements made of the lengths, &c. of anemometer pencils, for use in preparing an improved anemogram form.
Mr. Cobley has been absent on sick-leave for nearly three weeks.

R. H. Scott, Esq., F.R.S. R. H. CURTIS.

STATEMENT of WORK done in the EXAMINATION ROOM during the month of January 1882.

SIR, February 1st, 1882.

THE following curves and tabulations have been examined:—June: *Barograms*, three stations; *Anemograms*, seven stations.
July: *Barograms*, one station.
December: *Thermograms*, two stations; *Barograms*, two stations; *Anemograms*, two stations.
The "Notes of Errors" for June have been written out.

I am, &c.
T. E. ALLEN.

R. H. Scott, Esq., M.A., F.R.S., Secretary.

The following cheques for January were drawn on the 31st of that month :—

Administration:	£	s.	d.	£	s.	d.
A. J. Hodges, Council Income Tax - -	-		-	20	16	8
R. H. Scott, salary - - - -	-		-	66	13	4
J. S. Harding, jun. }	27	15	6			
T. D. Bell - - } Salaries and wages -	13	6	8			
J. S. Harding, sen. }	*8	19	8			
				50	1	10
The Gas Light and Coke Company, gas -	4	18	10			
,, ,, ,, -	0	4	2			
				5	3	0
Carried forward - - -				£142	14	10

* Four weeks ending 28th January.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	142	14	10
Administration—*cont.*						
Pall Mall Coal Company, coals - -	-		-	9	4	0
Asher & Co., books - - - -	2	11	6			
" " - - -	0	16	0			
				3	7	6
Pickford & Co., carriage of parcels - -	-		-	2	1	6
Special Researches:						
R. W. Munro, repairing "bridled" anemometer	-		-	12	14	0
Scottish Meteorological Society, Ben Nevis observations			-	100	0	0
Land Meteorology:						
C. E. Burton, anemograph tabulations - -	3	10	0			
" " - -	3	11	3			
				7	1	3
J. E. Cullum, salary - - - -	-		-	16	13	4
R. H. Curtis -	22	4	5			
J. A. Curtis -	15	11	1			
T. E. Allen -	15	11	1			
C. H. Thompson -	*9	4	0			
E. G. Aldridge -	*7	6	8			
Discussion, &c. of Observations.				69	17	3
Weather Telegraphy and Forecasts:						
F. Dangerfield, delivery of charts - -	-		-	12	7	6
Meteorological Society, weekly returns -	-		-	5	2	7
Postmaster General, telegrams - - -	-		-	218	15	6
Postmaster, Lerwick, Sunday fees - -	-		-	0	18	0
W. Wightman & Co., B.P. wrappers, &c. -	-		-	7	7	0
F. Gaster -	31	13	6			
W. L. Dallas -	19	15	1			
F. Brodie -	19	15	1			
G. G. Francis	18	18	4			
Preparation, &c. of Weather Reports.				90	2	0
Ocean Meteorology:						
Capt. H. Toynbee -	33	6	8			
Lieut. C. W. Baillie, R.N.	16	13	4			
R. Strachan - -	27	15	6			
C. Harding - -	22	4	5			
H. Harries - -	*11	4	0			
Discussion, &c. of observations and care of instruments.				111	3	11
Elliott Brothers, straight-edges - -	-		-	2	5	0
"Nautical Magazine," advertisements - -	-		-	1	2	6
J. R. Jones, Aberdeen agent - - -	-		-	1	11	1
J. Gill, Liverpool agent - - -	-		-	20	11	7
C. H. Permain, Southampton agent - -	-		-	5	12	8
Miscellaneous:						
J. J. Hicks, commission - - -	-		-	39	0	0
R. W. Munro, commissions - - -	-		-	190	19	0
Peninsular and Oriental S. N. Company, commissions -			-	1	2	0
J. S. Harding, jun., petty cash - -	100	0	0			
" " - -	80	0	0			
				180	0	0
Total -				£1,251	14	0

* Four weeks ending 28th January.

Submitted—The following statement of accounts for the nine months ending 31st December 1881 :—

Income.	£ s. d.	£ s. d.
Balance from year 1880–1		1,401 14 10
Proportion of vote for 9 months		11,250 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	14 13 1	
(2.) Special researches	4 18 6	
(3.) Observatories and stations	25 4 6	
		44 16 1
Supply of Weather Information :		
D.W. charts and forecasts	205 8 6	
6h. p.m. charts	18 15 0	
Information for Press Agencies, &c.	72 10 10	
Telegrams	202 16 2	
		499 10 6
Supply of Ocean statistics		6 3 0
„ Miscellaneous data		12 18 0
Sale of Instruments, &c. :		
Mercantile Marine account	50 12 7	
Royal Navy	3 6 6	
		53 19 1
Commission charged on work done for Colonies, &c.		18 15 8
		£13,287 17 2

Expenditure.	£ s. d.	£ s. d.
Administration :		
Payment of Council	750 0 0	
Secretary	600 0 0	
Salaries and wages	532 17 5	
Rent, fuel, and lighting	489 3 8	
Furniture and fittings	124 12 2	
Incidental and contingent expenses	277 8 11	
		2,774 2 2
Special Researches :		
Alterations to harmonic analyser and Mr. Burton's salary	104 19	
Mr. Strachan's Arctic work	22 10 0	
Balloon observations, &c. (not including lost balloon)	82 12 0	
Thermometer screen experiments and Mr. Kingston	20 10 0	
Rainfall observations	200 0 0	
Payment to Mr. Abercrombie (Barometer Manual)	15 15	
Payment to Capt. Toynbee (Cape work)	50 0	
Meteorological Atlas (Mr. Marriott)	34 15 0	
Scottish Meteorological Society (Ben Nevis observations)	100 0 0	
Fog experiments	86 7 3	
Sundry charges	46 17 1	
		764 5 4
Land Meteorology :		
Observatories and stations	1,873 12 4	
Discussion and reduction of observations	1,122 11 1	
		2,996 3 5
Weather Information and Forecasts :		
Telegraphic reports and storm warnings	2,292 8 8	
Preparation and issue of reports and forecasts	1,101 8 10	
		3,393 17 6
Inspections :		
Salaries and travelling expenses		448 19 11
Ocean Meteorology :		
Discussion and reduction of observations	1,134 3 11	
Expenses incidental to the supply of instruments :		
Proportion for care and issue of instruments	150 0 0	
Royal Navy	209 2 0	
Mercantile Marine	226 8 10	
Distant island and coast stations	16 5 0	
		1,735 19 9
Balance		1,174 9 1
		£13,287 17 2

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council	750 0 0	By cash at Bank	2,038 5 5
„ Post Office (partly estimated)	428 3 6	„ „ at Office	196 12 8
„ sundry creditors	919 7 5	„ „ at Valencia	50 0 0
„ „ (contracts or work uncompleted)	155 16 0	„ H.M. Exchequer	750 0 0
„ balance	1,174 9 1	„ sundry debtors	392 17 11
	£3,427 16 0		£3,427 16 0

SUBMITTED—The following STATEMENT respecting the RECORDS for June 1881, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

——	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action - - - - - -	Good.	Good.	Good.*	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock -	0	0	0	0	0	0	1	1	0	0	0	0	0	0
„ „ other causes -	0	0	0	0	0	0	0	0	0	0	0	0	†4	†4
Orientation verified - - - - -	30th	—	30th	—	16th	—	—	—	3rd	—	20th	—	6th	—
No. of errors discovered by subsidiaries -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	0	1	1	0	3	0	5	2	0	0	1	2	10
Result of 40 *Remeasurements*:—														
Greatest difference - - - - -	1·0	1·0	1·0	1·0	0·0	2·0	1·0	2·0	0·0	1·0	0·0	1·0	1·0	1·0
Mean difference irrespective of sign - -	0·0	0·4	0·1	0·4	0·0	0·5	0·0	0·6	0·0	0·5	0·0	0·5	0·0	0·7
Residual difference (— Meteorological Office) -	0·0	−0·1	+0·1	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	−0·1	0·0	+0·1
RAIN GAUGE:—														
Action - - - - - -	Good		Good.		Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock -	0		0		0		0		0		0		31 hrs.	
„ „ other causes - -	0		0		0		0		0		0		0	
Errors in tabulation - - - -	0		0		1		2		1		6		0	

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Indifferent.	Indifferent.	Indifferent.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
„ „ failure of light	0	0	3 hrs.	8 hrs.	0	0	0
„ „ other causes	0	0	0	§41 hrs.	0	0	0
No. of errors discovered—							
In entry of standard	0	0	0	8	2	3	0
„ calculating residual correction	0	0	0	1	1	0	0
„ applying residual correction	0	0	1	11	0	2	0
„ subtraction in subsidiary tables	0	0	0	2	0	3	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	13	1	0	0
Result of 40 *Remeasurements :—*							
Greatest difference	·004	·007	·010	·006	·006	·006	·006
Mean difference irrespective of sign	·001	·002	·003	·002	·002	·002	·002
Residual difference (—Meteorological Office)	·000	·000	—·001	·000	·000	·000	—·001
Mean monthly difference between simultaneous Barograph and Barometer readings	·002	·003	·001	·002	·002	·001	·002

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Bad.		Indifferent.		Do.		Do.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	14 hrs.	14 hrs.	0	0
„ „ failure of light	0	0	0	0	0	0	0	13 hrs.	0	0	0	1 hr.	0	2
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	0	—	1 hr.	—	0	—	0
„ „ partially frozen bulbs	—	0	—	0	—	0	—	0	—	0	—	0	—	0
„ „ other causes	0	0	‖2 hrs.	{‡2 hrs.} {‖2 hrs}	{‡1 hr.} {¶1 hr.}	{‡3 hrs.} {¶1 hr.}	0	‡1 hr.	**4 hrs.	**4 hrs.	0	0	0	0
No. of errors discovered in entry of Standard	0	0	2	0	0	0	5	2	0	0	3	0	0	2
„ „ by subsidiary measurements	0	0	2	0	0	0	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	1	0	0	0	2	7	2	1	0	1	0	2
„ „ detected under glass scale	0	0	8	2	7	0	43	4	3	8	0	1	4	2
Result of 40 *Remeasurements :—*														
Greatest difference	0·2	0·2	0·3	0·2	0·3	0·2	0·5	0·2	0·2	0·4	0·2	0·2	0·3	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·2	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	0·0	—0·1	—0·1	+0·1	—0·1	+0·1	0·0	0·0	—0·1	0·0	0·0	—0·1	—0·1
Mean monthly difference between simultaneous Thermograph and Thermometer readings	0·1	0·2	0·2	0·2	0·1	0·1	0·2	0·2	0·2	0·2	0·1	0·2	0·2	0·3
No. of errors in maxima and minima	0	—	5	—	3	—	12	—	3	—	0	—	2	—

* Traces intermittent at low velocities. † Pencils imperfectly adjusted. § Failure of photography. ‡ Photographic imperfections. ‖ Irregular action of shutter. ¶ Replacing gas-regulator. ** Painting screen.

116, *Victoria Street, February* 17, 1882.

PRESENT:

PROFESSOR G. G. STOKES IN THE CHAIR.

MR. DE LA RUE.	LIEUT.-GENERAL STRACHEY.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (February 3) were read and confirmed.

The subject of the proposed synoptic discussion of Atlantic weather was again considered, and a memorandum from Captain Toynbee recommending the adoption of Greenwich mean noon instead of local time for the charts was read (Letter M.O. 431), together with the following statement:—

STATEMENT as to TIME necessary to deal with 200 *Sets of Observations* obtained from SHIPS' LOGS for ATLANTIC CHARTS.

	Hours.
Making list of logs and sorting	1
Forming instrumental corrections	4
Obtaining *synchronous observations* (*Greenwich Noon*), correcting and posting on to forms	12*
Plotting on charts	8
Entering isobars and isotherms	12†
TOTAL	37
Further discussion	?

CHAS. HARDING,
February 8, 1882.

Captain Toynbee,
Marine Superintendent.

Resolved—That the observations asked for be for 8 a.m. and noon (local), and that they be a transcript of those entered in the ship's log, on forms supplied by the Office similar to that given on pp. 129–132.

The following memorandum and advertisement were ordered to be printed on the Minutes:—

METEOROLOGICAL OFFICE, LONDON.

THE Meteorological Council propose to undertake the preparation of Daily Weather Charts of the North Atlantic Ocean for the 13 months beginning on August 1st in the present year, and ending on August 31st, 1883.

It is well known that the changes of weather which we experience are in general caused by atmospheric disturbances which travel more or less rapidly, and undergo more or less modification during their progress. By far the larger number of the disturbances which visit the British Islands arrive on our shores from the Atlantic Ocean, and our earliest information as to any impending change is consequently derived from telegraphic reports from the Atlantic coasts, especially from the British Stations at Stornoway, Mullaghmore, and Valencia, and occasionally from the continental observatories at Rochefort and Corunna. But of the origin and previous history of these systems we have no sufficient knowledge, except in a few isolated cases.

The Meteorological Council believe that any systematic information which can be obtained as to the origin, development, and laws of motion of the atmospheric disturbances which occur over the Atlantic Ocean would promote the science of Meteorology, and be of immediate practical utility. Such information could not fail to be of benefit to seamen traversing the Atlantic Ocean, and would tend directly to the improvement of the forecasts and storm warnings issued to the British coasts, by rendering the interpretation of the first indications of approaching changes observed at the western meteorological stations more easy and certain.

The importance of a systematic study of the weather of the North Atlantic Ocean has long been recognised, and series of daily synoptic charts, more or less resembling those now in contemplation, have been prepared at various times, not only by the Meteorological Office, but also by the Association Scientifique de France under the guidance of Leverrier, by Captain Hoffmeyer, of the Danish Meteorological Institute, by the Deutsche Seewarte, at Hamburg, and (as a part of a wider plan) by the Chief Signal Office of the United States. But none of these charts, however valuable in other respects, supply adequate materials for a satisfactory discussion of Atlantic weather,

* If *local* noon be used, the time for correcting and posting on to forms would be 8 hours.

† It may be stated that entering the isobars and isotherms can be done as opportunity offers, and need in no way hinder the charting of observations as logs or forms are received.

chiefly on account of the small number of the observations upon which they are founded as compared with the magnitude of the area over which they are spread.

Evidence of the interest attaching to the connexion between English and Atlantic weather is afforded by the efforts which have been made during the last few years by the proprietors of the "New York Herald" to transmit to England from America telegraphic predictions of approaching disturbances, which (it is presumed) are founded on the reports of vessels arriving in America from the Atlantic Ocean. Reports such as these from a large number of vessels would be of great value; but the predictions taken by themselves cannot be utilized in a scientific investigation of weather.

The Meteorological Council gratefully acknowledge the large measure of invaluable help which they have hitherto received from seamen and the shipping interest generally. But as the object now proposed can only be achieved by the voluntary co-operation of an increased number of observers, they feel justified in making a special appeal for assistance to the owners, captains, and officers of ships, and especially to the great companies whose steamers ply between this country and America. In a science which, like meteorology, is still in its infancy, every advance is attended with great difficulties, and the Council are well aware that it would be easy to be too sanguine as to the importance of the results to be obtained by the inquiry which they are about to undertake. But having regard to the loss of life and property occasioned by storms on our coasts,* they feel confident that their proposal will commend itself to the public generally, and will ensure the active co-operation of those classes of the community for whose benefit it is primarily intended.

It is proposed to ask for observations of the barometer, of open air and sea surface temperatures, wind (direction and force) and weather at 8 a m. and noon each day, with the position of the ship at noon.

ADVERTISEMENT.

METEOROLOGICAL OFFICE, LONDON.—The Meteorological Council propose to discuss the meteorology of the North Atlantic from August 1st, 1882, to August 31st, 1883, and will be much obliged to shipowners, captains, and officers who will, during those thirteen months, supply them with observations of barometer, and, if possible, open air and sea surface temperatures, wind (direction and force), and weather, at 8 a.m. and noon each day, with position of the ship at noon. Forms for recording the observations will be supplied by the Meteorological Office, 116, Victoria Street, London, S.W., on application to the Marine Superintendent.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 6 logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. J. Metcalfe -	S.S. "Oceanic"	May 4—Oct. 15, 1881.	San Francisco to Hong Kong.	1881, p. 55.
Capt. C. W. Pearson	S.S. "Strathleven."	July 19, 1881—Feb. 11, 1882.	London, Hiogo, and New York, viâ Suez.	1881, p. 42.
Capt. E. W. Turner	"Mertola" -	March 30, 1881—Feb. 3, 1882.	Liverpool and the Guadiana, 3 voyages.	1881, p. 22.
Capt. W. Waring -	S.S. "Gordon Castle."	Sept. 18, 1881—Jan. 19, 1882.	London to China, and home.	1881, p. 35.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Read a letter (No. 339) from Professor Wild, President of the International Polar Commission, inquiring if Mr. Scott could accept a seat on that Commission, should one become vacant.

Resolved—That the Secretary be authorised to accept an invitation to be a member of the International Polar Commission, in case one should be sent to him.

* The Wreck Return published by the Board of Trade for the year ending 30th June 1880 [C. 2906], (the last published), gives on p. 20 the following list of casualties on our coasts attributable to causes connected with the weather:

——		Total Losses.	Serious Casualties.	Minor Casualties.	Total.
1879–80	Founderings - -	16	0	0	16
	Strandings - -	81	108	176	365
	Other causes - -	0	105	405	510
Totals for 1879–80 - - -		97	213	581	891 gross total.
Totals for 1878–79 - - -		121	227	761	1,109 gross total.
Totals for 1877–78 - -		138	289	1,002	1,429 gross total.
Totals for 1876–77 - - -		180	367	1,358	1,805 gross total.

Read a letter (No. 385) from Mr. Whipple, applying for a grant of 30*l.* (or 40*l.* on an alternative plan), for the discussion of the comparison of the Russian and Stevenson's thermometer screens (Minutes, p. 86).

Resolved—That a discussion be made of selected days of contrasted weather (such as calm or windy, dull or sunny, dry or damp, at one season or another), and that a sum not exceeding 10*l.* be assigned for the purpose.

Submitted—The following reports on the checking of the forecasts for November and December 1881 for January 1882:—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

NOVEMBER.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	35	58	47	89
"	b	53	31	42	
"	c	4	8	6	
"	d	8	3	5	
Scotland, E.	a	38	38	38	85
"	b	46	47	47	
"	c	8	11	9	
"	d	8	4	6	
England, N.E.	a	38	27	33	83
"	b	54	46	50	
"	c	4	19	11	
"	d	4	8	6	
England, E.	a	23	35	29	89
"	b	73	46	60	
"	c	—	15	7	
"	d	4	4	4	
Midland Cos.	a	31	19	25	85
"	b	62	58	60	
"	c	4	15	10	
"	d	3	8	5	
England, S.	a	31	16	24	80
"	b	57	54	56	
"	c	4	19	11	
"	d	8	11	9	
Scotland, W.	a	27	24	26	70
"	b	43	46	44	
"	c	23	19	21	
"	d	7	11	9	
England, N.W.	a	27	20	24	80
"	b	62	50	56	
"	c	11	11	11	
"	d	—	19	9	
England, S.W.	a	8	31	20	80
"	b	77	43	60	
"	c	15	15	15	
"	d	—	11	5	
Ireland, N.	a	36	32	34	84
"	b	56	44	50	
"	c	8	20	14	
"	d	—	4	2	
Ireland, S.	a	20	52	36	88
"	b	64	40	52	
"	c	12	4	8	
"	d	4	4	4	

8 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	33	57	45	88
"	b	57	30	43	
"	c	10	10	10	
"	d	—	3	2	
Scotland, E.	a	27	37	32	81
"	b	57	40	49	
"	c	16	16	16	
"	d	—	7	3	
England, N.E.	a	33	17	25	84
"	b	57	60	59	
"	c	10	20	15	
"	d	—	3	1	
England, E.	a	27	27	27	77
"	b	63	37	50	
"	c	10	16	13	
"	d	—	20	10	
Midland Cos.	a	16	13	15	80
"	b	84	46	65	
"	c	—	31	15	
"	d	—	10	5	
England, S.	a	40	17	29	77
"	b	53	43	48	
"	c	7	13	10	
"	d	—	27	13	
Scotland, W.	a	20	27	24	74
"	b	60	40	50	
"	c	20	23	21	
"	d	—	10	5	
England, N.W.	a	30	30	30	70
"	b	57	23	40	
"	c	13	27	20	
"	d	—	20	10	
England, S.W.	a	30	23	27	65
"	b	44	33	38	
"	c	23	31	27	
"	d	3	13	8	
Ireland, N.	a	33	30	32	82
"	b	57	43	50	
"	c	7	27	17	
"	d	3	—	1	
Ireland, S.	a	30	50	40	82
"	b	53	30	42	
"	c	10	17	13	
"	d	7	3	5	

SUMMARY.

British Isles	a	29	32	31	83
"	b	59	46	52	
"	c	8	14	11	
"	d	4	8	6	

British Isles	a	29	30	30	78
"	b	58	39	48	
"	c	12	21	17	
"	d	1	10	5	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

DECEMBER.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	19	56	38	81
,,	b	64	22	43	
,,	c	14	14	14	
,,	d	3	8	5	
Scotland, E.	a	26	51	39	80
,,	b	63	19	41	
,,	c	8	19	13	
,,	d	3	11	7	
England, N.E.	a	19	26	23	77
,,	b	67	41	54	
,,	c	7	30	18	
,,	d	7	3	5	
England, E.	a	45	41	43	84
,,	b	41	41	41	
,,	c	14	11	13	
,,	d	—	7	3	
Midland Cos.	a	30	26	28	77
,,	b	45	52	49	
,,	c	25	14	19	
,,	d	—	8	4	
England, S.	a	30	14	22	78
,,	b	48	64	56	
,,	c	22	3	13	
,,	d	—	19	9	
Scotland, W.	a	19	48	34	69
,,	b	52	19	35	
,,	c	26	19	23	
,,	d	3	14	8	
England, N.W.	a	19	41	30	73
,,	b	56	30	43	
,,	c	25	26	26	
,,	d	—	3	1	
England, S.W.	a	19	45	32	79
,,	b	56	38	47	
,,	c	22	3	13	
,,	d	3	14	8	
Ireland, N.	a	22	30	26	67
,,	b	42	40	41	
,,	c	22	19	21	
,,	d	14	11	12	
Ireland, S.	a	22	34	28	62
,,	b	26	41	34	
,,	c	33	14	23	
,,	d	19	11	15	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	29	65	47	90
,,	b	62	23	43	
,,	c	9	6	7	
,,	d	—	6	3	
Scotland, E.	a	32	32	32	86
,,	b	62	45	54	
,,	c	3	23	13	
,,	d	3	—	1	
England, N.E.	a	19	29	24	76
,,	b	58	45	52	
,,	c	19	26	22	
,,	d	4	—	2	
England, E.	a	32	23	28	76
,,	b	48	48	48	
,,	c	20	26	23	
,,	d	—	3	1	
Midland Cos.	a	23	33	28	85
,,	b	65	48	57	
,,	c	9	16	12	
,,	d	3	3	3	
England, S.	a	23	26	25	70
,,	b	45	45	45	
,,	c	32	19	25	
,,	d	—	10	5	
Scotland, W.	a	16	23	20	78
,,	b	65	52	58	
,,	c	13	19	16	
,,	d	6	6	6	
England, N.W.	a	29	35	32	72
,,	b	52	29	40	
,,	c	19	23	21	
,,	d	—	13	7	
England, S.W.	a	19	29	24	81
,,	b	65	48	57	
,,	c	10	13	11	
,,	d	6	10	8	
Ireland, N.	a	29	39	34	80
,,	b	52	39	46	
,,	c	6	16		
,,	d	13	6	9	
Ireland, S.	a	26	48	37	76
,,	b	48	29	39	
,,	c	10	13	11	
,,	d	16	10	13	

SUMMARY.

British Isles	a	25	37	31	75
,,	b	51	37	44	
,,	c	20	16	18	
,,	d	4	10	7	
British Isles	a	25	35	30	79
,,	b	56	41	49	
,,	c	14	18	16	
,,	d	5	6	5	

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

JANUARY 1882.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	35	46	41	76
,,	b	35	35	35	
,,	c	26	4	5	
,,	d	4	15	9	
Scotland, E.	a	27	43	35	75
,,	b	50	30	40	
,,	c	15	23	19	
,,	d	8	4	6	
England, N.E.	a	38	23	31	75
,,	b	43	46	44	
,,	c	11	27	19	
,,	d	8	4	6	
England, E.	a	42	27	35	79
,,	b	50	38	44	
,,	c	4	23	13	
,,	d	4	12	8	
Midland Cos.	a	23	27	25	81
,,	b	65	46	56	
,,	c	8	27	17	
,,	d	4	—	2	
England, S.	a	19	31	25	79
,,	b	62	46	54	
,,	c	15	23	19	
,,	d	4	—	2	
Scotland, W.	a	8	42	25	77
,,	b	69	35	52	
,,	c	15	19	17	
,,	d	8	4	6	
England, N.W.	a	23	46	35	81
,,	b	65	27	46	
,,	c	8	19	13	
,,	d	4	8	6	
England, S.W.	a	46	43	45	87
,,	b	42	43	42	
,,	c	8	10	9	
,,	d	4	4	4	
Ireland, N.	a	42	38	40	90
,,	b	54	46	50	
,,	c	—	12	6	
,,	d	4	4	4	
Ireland, S.	a	35	50	43	88
,,	b	53	38	45	
,,	c	8	4	6	
,,	d	4	8	6	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentages of Success a + b.
Scotland, N.	a	26	39	33	73
,,	b	48	32	40	
,,	c	26	6	16	
,,	d	—	23	11	
Scotland, E.	a	19	29	24	70
,,	b	62	30	46	
,,	c	19	6	12	
,,		—	35	18	
England, N.E.	a	26	23	25	78
,,	b	61	45	53	
,,	c	13	23	18	
,,	d	—	9	4	
England, E.	a	29	23	26	59
,,	b	39	27	33	
,,	c	23	30	27	
,,	d	9	20	14	
Midland Cos.	a	23	30	27	70
,,	b	55	32	43	
,,	c	16	29	22	
,,	d	6	9	8	
England, S.	a	23	19	21	84
,,	b	69	57	63	
,,	c	8	14	11	
,,	d	—	10	5	
Scotland, W.	a	19	36	28	77
,,	b	62	36	49	
,,	c	10	19	14	
,,	d	9	9	9	
England, N.W.	a	19	26	23	83
,,	b	69	52	60	
,,	c	9	9	9	
,,	d	3	13	8	
England, S.W.	a	33	40	37	79
,,	b	52	33	42	
,,	c	9	23	16	
,,	d	6	4	5	
Ireland, N.	a	42	45	44	89
,,	b	55	35	45	
,,	c	—	17	8	
,,	d	3	3	3	
Ireland, S.	a	40	43	42	87
,,	b	53	37	45	
,,	c	7	7	7	
,,	d	—	13	6	

SUMMARY.

British Isles	a	31	38	35	81
,,	b	53	39	46	
,,	c	11	17	14	
,,	d	5	6	5	
British Isles	a	27	32	30	77
,,	b	57	38	47	
,,	c	13	17	15	
,,	d	3	13	8	

Reported—That Mr. J. Sheerman had been appointed to work the harmonic analyser in the place of Mr. Burton (resigned), at a salary of two guineas per week for eight hours work daily.

116, *Victoria Street, March* 10, 1882.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (February 17) were read and confirmed.

Read the following letter (Minutes, p. 88*c*) :—

Royal Society, Burlington House,
March 9, 1882.

SIR,

I BEG leave to transmit to you, for the information of the Meteorological Council, the enclosed copies of letters which have passed between the Treasury and the Royal Society in reference to the continuation of the work of the Meteorological Council.

I have, &c.
(Signed) M. FOSTER,
Sec. R.S.

To the Secretary of the Meteorological Council.

The correspondence printed in the Minutes of Council of December 15 having been referred to, the following letters were read :—

"The Royal Society, Burlington House,
December 29th, 1881.

" MY LORD,

" THE President and Council of the Royal Society have watched with careful interest the proceedings of the Meteorological Office as recorded in its annual reports, and have fully appreciated their importance. But before replying to your Lordship's letter (18128/81) they have thought it best to consult with the Meteorological Council, in order to ascertain whether, in the opinion of that body, there were any particulars in which the range of their functions, or the organization of the staff, could with advantage be modified. Their reply contains so clear a statement of the points arising for consideration, that the President and Council beg leave to enclose a copy, and to take it as a basis for the remarks which they now venture to make.

" Paragraphs I. and II. contain statements of fact, which show that the Meteorological Council and its staff have performed their duties with great energy and judgment.

" The President and Council entirely concur with the remarks made in Paragraph III. as to the great importance of the early communication of telegraphic intelligence for storm warnings both to and from the Meteorological Office. They trust that it may be found possible to renew the privilege of priority formerly granted to the Office, as well as to make arrangements for special rates and the adoption of a code, as suggested in Paragraph IV.

" On the question raised in Paragraph V., the President and Council beg to express their concurrence in the statement of the paramount importance to the science of meteorology of the receipt of accurate information of weather changes, as near the time of their occurrence as possible.

" Although the subject of Paragraph VI. is perhaps not directly within the province of the Royal Society, the President and Council would urge the importance of fostering such a spirit of loyalty among the employés of the Office as would arise from their feeling that, in the event of old age, they are not in a position so materially different as at present from that of clerks, of no higher qualifications, in regular Government offices. The very peculiar nature of their duties on the one hand requires special experience and qualifications, and on the other renders it more difficult for them to seek employment elsewhere; so that independently of considerations of fairness to the present staff, some of whom have actually been transferred from Government office, there is danger in the future that properly qualified men may not venture to engage in the work of the Office.

" In conclusion, the President and Council beg to express a hope that the constitution of the Meteorological Council may remain unchanged; and that the same gentlemen who have hitherto performed its duties and administered its funds with such intelligence and judgment may be disposed to continue their labours.

" The President and Council have learned with sincere regret that the state of the health of Mr. De La Rue, who served on the original Meteorological Committee as well as on the present Council, has compelled him to withdraw from active participation in the work. Mr. De La Rue's great general scientific knowledge, and special acquaintance with a variety of mechanical operations, as well as with the methods of practical business, have been of such service, that the President and Council hope that the Meteorological Council may still be able, from time to time, to have the advantage of his experience and advice: with this view they venture to suggest that his name may perhaps be retained as an honorary member of that body, without salary. The President and Council have reason to believe that such an arrangement would be agreeable both to Mr. De La Rue and to his colleagues. If it should be considered desirable to maintain the present number of ordinary members, the President and Council will be happy to nominate another gentleman for the post.

(Signed) " W. SPOTTISWOODE,
" Pres. R. S."

" To the Lord F. Cavendish.

"22031.

"SIR, "Treasury Chambers, 31st December 1881.

"In reply to your letter of the 29th inst., enclosing copy of a statement from the Meteorological Council upon points referred to them by the Council of the Royal Society, which had been suggested by the letter (18,128) addressed to you from this Board on the 10th ult., I am directed by my Lords to acquaint you, for the information of the Council of the Royal Society, that my Lords have read with much pleasure the conclusion arrived at by yourself and the Council—that the constitution of the Meteorological Council should remain unchanged, and that the same gentlemen, who have hitherto performed its duties and administered its funds with so much intelligence and judgment, should be invited to continue their labours.

"As regards Mr. De La Rue, my Lords learn the cause of his retirement with much regret from the position of an ordinary member of the Meteorological Council, and they readily concur in the proposal to retain his name as an honorary member of that body, in the hope that he may still be able to give to it, from time to time, the advantage of his experience and advice. If the Council of the Royal Society is of opinion that, under these circumstances, it is desirable to appoint a new ordinary member in Mr. De La Rue's place, in order to maintain the consideration which has thus far attached to the proceedings of the Council, my Lords will receive, with pleasure, from the Council of the Royal Society the nomination of a gentleman for the post. They would be unwilling, however, to commit themselves to any precedent for a permanent increase of the members of the Meteorological Council beyond a chairman, four nominees, and the Hydrographer of the Admiralty *ex officio*.

"My Lords will give their attentive consideration to the various points which are suggested in the paper of the Meteorological Council.

"As regards the priority and cost of meteorological telegrams, my Lords will communicate with the Postmaster-General. It is unnecessary to point out that there is, *primâ facie*, great objection to grant privileges which it is very difficult to confine to those who first obtain them. They admit, however, the importance of time in meteorological notices, and they will be disposed to favour any exception in respect of them which can be proved to their satisfaction to be free from the danger of extension. The cost of telegrams, in a service wholly maintained out of public revenue, is a question of less importance, and there are very strong reasons against all differential rates whatever.

"My Lords are willing to make the grant for the year 1882–3 15,300*l.* instead of 15,000*l.*, in order to compensate the Meteorological Council for its loss upon the issue to the public of the 8 p.m. forecasts gratis.

"The question of superannuation for the employés of the Meteorological Council is, as you justly observe, surrounded with many difficulties. My Lords would be extremely unwilling to take any step which should tend to convert the Council into a department of the civil service, for reasons which have been frequently stated.

"My Lords are not aware that any of the gentlemen employed by the Council accepted service on the terms that they were to receive superannuation allowances, and my Lords cannot recognize them as having any right to them. They are not prepared to say more than that the Council must judge, for the time being, how best to apply the fund placed at its disposal; and that if cases should arise in which, in their judgment, it was proper to make some allowance to *gentlemen who had long and faithfully served them, but were no longer able to perform their duties*, they must reckon, like other employers, what they can afford to do. My Lords are not prepared to recognize any direct relation between the officers of the Council and the Government.

My Lords are of opinion that the best footing for the Council to remain upon will be, that no date should be fixed for its dissolution until either Her Majesty's Government or the Royal Society expresses a wish to terminate the existing arrangement, after having given not less than twelve months' notice of their intention, or such shorter notice as may satisfy the other party.

"I am to request that you will cause the thanks of my Lords to be conveyed to the members of the Council for the attention and ability which they have devoted to their duties.

(Signed) "R. R. W. LINGEN.

"The President of the Royal Society,
'Burlington House, Piccadilly, W."

M.O. 924.

"SIR, January 21, 1882.

"I AM happy to inform you that Mr. De La Rue's health is so much restored that it is unnecessary at present to appoint a new member of the Meteorological Council.

(Signed) W. SPOTTISWOODE, P.R.S."

"To the Secretary of the Treasury.

Mr. De La Rue accordingly remains an ordinary Member of the Council.

Reported—That on the 3rd instant the following letter had been received by Mr. Dallas, with reference to his nomination to the post of Scientific Assistant to the Meteorological Reporter at Calcutta (Minutes, p. 112):—

R. S. & C. 265.

SIR, India Office, S.W., March 3, 1882.

I AM directed by the Secretary of State for India in Council to inform you that, on the recommendation of the Meteorological Council, he has nominated you to the post of Scientific Assistant to the Meteorological Reporter to the Government of India, on a salary rising from Rs. 500 to Rs. 750 per mensem.

I am to forward for your information the enclosed extract from a letter from the Government of India, which will acquaint you with the special duties in which it is deemed desirable that you should perfect yourself before proceeding to India. With this view you will be placed on duty for two months from the date of this letter on the usual rate of duty allowances to Indian officers in England, viz. two-thirds of your Indian pay.

I am, &c.

W. L. Dallas, Esq., Meteorological Office. (Signed) ENFIELD.

The Secretary was instructed to write the following letter to the India Office :—

M.O. 2320.

Meteorological Office, 116, Victoria Street, London, S.W.,

MY LORD, March 13, 1882.

WITH reference to my letter to you of the 9th ultimo (S. & C. 1425, 1881), and to a letter from your Lordship to Mr. Dallas (R. S. & C. 265) of the 3rd instant, I have to point out that Mr. Dallas is under engagement to this Office, and has to give due notice before he can be free to accept a new appointment.

He is also instructed to study specially the work of the Marine Branch of this Office, and the operations conducted at the Observatory of Kew. The former of these will require at least a month or six weeks, in order to prepare him adequately for dealing with the materials furnished by this Office to the Calcutta Office, relating to the meteorology of the Indian Seas.

The latter would require at least a month, as he has not had any experience in observatory work, in the inspection of stations, or in the verification of instruments.

Mr. Blanford has also intimated to me that it was desirable that his future assistant should repair to Brussels to learn the practical working of van Rysselberghe's meteorograph, which apparatus has been recently supplied to more than one Indian Station. This would require more than a week. A visit of some days to Paris was also recommended by Mr. Blanford.

It would therefore appear that it would not be possible, if the foregoing considerations receive attention, for Mr. Dallas to leave England on the 3rd of May, as proposed in your letter. As Mr. Dallas has not been accustomed to a tropical climate I would venture to submit to your Lordship that if Mr. Blanford made no serious objection, Mr. Dallas's training and departure for India might be timed so that he should arrive at Calcutta in the autumn. This arrangement would give him ample time for complete preparation for his work. I am also informed by Mr. Dallas that, from his conversations with Mr. Blanford, he has been left under the impression that his presence in India is not urgently needed, and that the delay suggested would not be objected to. It would be understood that if Mr. Dallas's departure was delayed, he would have no claim to any allowance from the India Office in excess of that described in your Lordship's letter under reply.

I am, &c.

The Under Secretary of State for India, (Signed) ROBERT H. SCOTT,
India Office, London, S.W. Secretary.

Read the following letter :—

M.O. 600.

SIR, Lloyd's, E.C., March 6, 1882.

I AM instructed by the Committee of Lloyd's to enclose you herewith some correspondence which has been forwarded to the Committee by Lloyd's agents at Shanghai, with reference to the organization of a system of weather forecasts for the China Coast. The Committee of Lloyd's regret that by their Act of Incorporation they are precluded from devoting funds to this purpose. It would, however, appear that the matter is one which might be of great advantage to the mercantile community, and I am accordingly directed to forward the correspondence to you with a view to its being placed before the proper Department of Her Majesty's Government.

I am to beg that you will be good enough to allow the correspondence to be returned to this office when done with.

I am, &c.

The Secretary, Meteorological Office, S.W. (Signed) H. M. HOZIER,
Secretary.

The Secretary was instructed to draft a letter to the Colonial Office calling attention to the importance of the proposal, and intimating that the Indian Government have organized a storm warning system for the Bay of Bengal.

Read a letter from the Foreign Office (No. 527), enclosing a letter from M. Ismalun of Cairo, stating that a meteorological organization was in existence in Egypt, and asking for an exchange of Daily Weather Reports, &c.—Authorised.

Read letter No. 634, from the War Office, requesting the Council to pay the sum of 123*l.* 0*s.* 2*d.* for the lost balloon "Saladin" and certain stores (Minutes, p. 103).—The payment was ordered to be made.

Mr. Scott reported that he had in his custody part of a broken thermometer, which had been in the balloon when lost, and was washed ashore at Chesil Cove, Portland, on December 21st, 11 days after the accident (Letters 2337/81 and 306/82).

He was instructed to offer this thermometer for acceptance to Mrs. A. Jenkins, the sister of the late Mr. Powell, and the Chairman was requested to write to Mrs. Jenkins, expressing the deep regret of the Council for Mr. Powell's death.

SUBMITTED—The following STATEMENT respecting the RECORDS for July 1881, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :—	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.
Action														
Records deficient, due to stoppage of clock	0	0	11 hrs.	12 hrs.	15 hrs.	17 hrs.	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orientation verified	30th	—	30th	—	20th	—	1st	—	1st	—	20th	—	6th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	1	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	0	2	0	0	0	2	2	0	0	3	0
Result of 40 *Remeasurements* :—														
Greatest difference	1·0	1·0	1·0	1·0	1·0	1·0	0·0	2·0	0·0	1·0	1·0	2·0	0·0	2·0
Mean difference irrespective of sign	0·0	0·4	0·0	0·4	0·1	0·4	0·0	0·7	0·0	0·3	0·0	0·6	0·0	0·7
Residual difference (—Meteorological Office)	0·0	+0·2	0·0	+0·1	0·0	0·0	0·0	0·0	0·0	+0·2	0·0	0·0	0·0	−0·1
RAIN GAUGE :—														
Action	Good.		Indifferent.		Good.		Good.		Good.		Good.		Indifferent.	
Records deficient, due to stoppage of clock	0		24 hrs.		0		0		0		6 hrs.		4 hrs.	
„ „ other causes	0		0		0		0		0		*4 hrs.		0	
Errors in tabulation	0		2		1		4		9		0		1	

BAROGRAPH :—

Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Indifferent.	Bad.	Indifferent.	Indifferent.	Do.	Indifferent.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
„ „ failure of light	0	2 hrs.	3 hrs.	0	2 hrs.	0	0
„ „ other causes	0	†1 hr.	0	0	0	0	0
No. of errors discovered—							
In entry of standard	0	1	4	4	8	0	0
„ calculating residual correction	0	1	2	3	2	0	0
„ applying residual correction	0	0	1	7	0	3	1
„ subtraction in subsidiary tables	0	0	0	1	4	0	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	5	5	3	1	0	0
Result of 40 *Remeasurements* :—							
Greatest difference	·007	·009	·009	·012	·005	·007	·007
Mean difference irrespective of sign	·002	·002	·003	·003	·002	·002	·002
Residual difference (—Meteorological Office)	+·001	·000	·000	+·001	·000	·000	·000
Mean monthly difference between simultaneous barograph and barometer readings	·002	·003	·001	·001	·002	·001	·002

THERMOGRAPH :—

Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Photography	Do.		Indifferent.		Bad.		Indifferent.		Do.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	10 hrs.	10 hrs.	0	0
„ „ failure of light	0	0	2 hrs.	2 hrs.	0	3 hrs.	0	2 hrs.	0	0	0	0	0	0
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	0	—	0	—	5 hrs.	—	0
„ „ partially frozen bulbs	—	0	—	0	—	0	—	0	—	0	—	0	—	0
„ „ other causes	0	0	0	0	‡1 hr.	‡2 hrs.	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	0	0	1	1	1	1	1	0	0	0	1	0	1
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	1	1	0	1	4	7	2	2	1	1	1	0
„ „ detected under glass scale	0	0	2	1	0	0	6	1	3	1	0	0	3	7
Result of 40 *Remeasurements* :—														
Greatest difference	0·2	0·2	0·2	0·2	0·2	0·2	0·4	0·5	0·2	0·2	0·2	0·2	0·4	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	+0·1	0·0	0·0	0·0	—0·1	+0·1	0·0	+0·1	—0·1	—0·1	0·0	—0·1	—0·1
Mean monthly difference between simultaneous thermograph and thermometer readings	0·2	0·2	0·2	0·2	0·1	0·1	0·2	0·2	0·2	0·2	0·1	0·1	0·2	0·3
No. of errors in maxima and minima	0	—	4	—	5	—	6	—	3	—	3	—	2	—

* Examining gauge. † Photographic imperfection. ‡ Doubtful.

The consideration of the proposed synoptic discussion of the weather of the North Atlantic Ocean was resumed.

The memorandum explanatory of the general objects of the undertaking, the advertisement to be inserted in newspapers, and the paper of instructions to observers, with the accompanying form for recording observations, were further amended and finally settled.

It was resolved that these papers should now be issued; a proof of the instructions to observers and of the form for observations being first submitted to the Hydrographer.

Submitted—A report by the Secretary on the storm of October 14, 1881, as requested by Council (Resolution ii., Minutes, p. 56).

Resolved—That this report be published in 8vo.

Submitted—The temperature charts for the three oceans, completed by Mr. Baillie.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 15 logs had been received, 11 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Mr. D. W. Barker (2nd officer).	"Superb" -	April 18, 1881—Feb. 13, 1882.	London to Melbourne -	1880, p. 128.
Capt. W. Barron -	S.S. "Sultan" -	Oct. 19, 1881—Feb. 19, 1882.	Hull and Hamburg -	1881, p. 77.
Comm. E. Bourke, R.N.	H.M.S. "Gannet."	Jan. 1—Dec. 31, 1881.	West Coast of America Station.	1880, p. 128.
Capt. W. C. Crutchly, R.N.R.	S.S. "African"	May 28, 1881—March 4, 1882.	Plymouth, Cape, and S. Africa.	1880, p. 122.
Capt. P. Murdoch -	"Sierra Estrella"	May 18, 1881—Feb. 19, 1882.	Point de Galle, Rangoon, Home.	1881, p. 3.
Capt. W. C. Smith -	S.S. "Gannet" -	Nov. 1, 1881—Feb. 13, 1882.	London, Calcutta, Home viâ Suez.	1881, p. 55.
Capt. W. Spratly -	S.S. "Rubens" -	Dec. 5, 1881—Feb. 16, 1882.	Liverpool, Monte Video, Antwerp.	1878, p. 130.
Capt. W. Symington	S.S. "Hankow"	Oct. 16, 1881—Feb. 20, 1882.	Cape of Good Hope, Bombay, Home.	1881, p. 55.
Staff-Com. T. H. Tizard, R.N.	H.M. hired vessel "Knight Errant."	May 1—Sept. 1, 1881.	Surveying West Coast of United Kingdom.	1880, p. 96.
Capt. W. J. L. Wharton, R.N., and Lieut. G. C. Frederick, R.N.	H.M.S. "Fawn"	Sept. 1—Dec. 31, 1881.	Surveying Sea of Marmora.	1879, p. 61.
Capt. Thomas Young (assisted by Mr. H. A. Pike, 2nd officer).	"City of Agra"	May 30, 1881—Feb. 15, 1882.	London and Melbourne -	1881, p. 3.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted—The following statements of work for February 1882:—

March 8, 1882.

MARINE ROOM.

Examined 13 new logs and 5 lighthouse registers.

Cape of Good Hope District.

Cape Gales.—Lithographer's proofs of Plates I. to V. for January examined. Original diagrams of July gales. Plates VI. to X. prepared for lithographer. Various work connected with letter-press.

General.

Atlantic Synoptic Charts for August 1882 *to August* 1883.—Various work on the method of discussion. Drawing out forms for recording and preparing estimate of time necessary to chart.

Plotting Sea Temperatures in all oceans, from *Office Logs*, now completed.

Preparation of charts for plotting barometer observations in Pacific Ocean, 16 sheets, completed.

Barometer observations for the months of February, May, August, and November in the North and South Atlantic well advanced.

Posting index of data in Ocean 10° Squares.

CHAS. HARDING.
HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq.

PANTAGRAPH ROOM.

Copper Plates pantagraphed:—1 plate, No. 18, 1877; 2 plates, Nos. 2 and 3, 1880, partially re-pantagraphed; 3 chart plates, Nos. 8 to 10, 1876.

Zinc Plates:—Barograms, 3 plates, Nos. 22 to 24, 1877; Thermograms, 10 plates, Nos. 30 to 39, 1877; Vapour Tension, 6 plates, Nos. 18 to 23, 1877; Anemograms, 6 plates, Nos. 35 to 40, 1877; Rain Curves, 18 plates, Nos. 19 to 36, 1877.

Photographic Curves are prepared for pantagraphing to Plate 43 (1877) for thermograms; the barograms are not in advance of the zinc plates.

The proofs of all the plates for 1880 have been examined and signed for press. A new anemogram form has been prepared and engraved on a copper plate. The harmonic analyser has not re-commenced work yet, Mr. Sheerman having been occupied since the 20th inst. on preliminary work.

Mr. Cobley has been away on sick-leave during the greater part of the month.

R. H. Scott, Esq., F.R.S. — R. H. CURTIS.

EXAMINATION ROOM.

SIR,

THE following curves and tabulations have been examined:—

July: *Thermograms*, four stations; *Barograms*, four stations; *Anemograms*, seven stations.

The *Notes of Errors* for *October*, *November*, and *December*, for the two Irish Stations (Valencia and Armagh), and for the month of *July* for all stations have been written out.

I am, &c.

R. H. Scott, Esq., M.A., F.R.S., Secretary. — T. E. ALLEN.

The following cheques for February were drawn on the 28th of that month:—

		£ s. d.	£ s. d.
Administration:			
R. H. Scott, salary		- - -	66 13 4
J. S. Harding, jun.	Salaries and wages	27 15 6	
T. D. Bell		13 6 8	
J. S. Harding, sen.		*8 19 8	
			50 1 10
G. A. Gillett, wood, &c.		- -	1 16 4
E. Baxter, printing		- -	4 18 0
V. G. M. Holt, books		- -	2 0 6
Pickford & Co., carriage of parcels		- -	1 7 6
Special Researches:			
Negretti & Zambra, instruments for balloon experiments		-	7 3 3
C. E. Strachan, Arctic work		- -	2 2 0
W. J. Russell, fog experiments		- -	50 0 0
Land Meteorology:			
C. E. Burton, tabulating anemograms		- -	5 5 0
J. E. Cullum, salary		- -	16 13 4
R. W. Munro, tabulating scales		2 18 6	
,, repairing Falmouth anemometer		8 12 6	
			11 11 0
R. H. Curtis	Discussion, &c. of Observations.	22 4 5	
J. A. Curtis		15 11 1	
T. E. Allen		15 11 1	
C. H. Thompson		*9 4 0	
E. G. Aldridge		*7 6 8	
			69 17 3
Weather Information and Forecasts:			
W. L. Fox, telegrams		- -	5 16 8
Postmaster General, telegrams		214 13 6	
,, ,,		22 0 0	
			236 13 6
F. Gaster	Preparation, &c. of Weather Reports.	29 1 6	
W. L. Dallas		20 12 1	
F. Brodie		19 15 1	
G. G. Francis		18 3 4	
			87 12 0
Carried forward		- -	£619 11 6

* Four weeks ending 25th February.

	£	s.	d.	£	s.	d.
Brought forward -	-		-	619	11	6
Ocean Meteorology:						
Capt. H. Toynbee - -	33	6	8			
Nav. Lieut. C. W. Baillie, R.N.	16	13	4			
R. Strachan - - -	27	15	6			
C. Harding - - -	22	4	5			
H. Harries - - -	*11	4	0			
Discussion, &c. of observations and care of instruments.				111	3	11
Negretti & Zambra, "A." instruments -	115	12	0			
" " "B. T." " -	18	17	0			
				134	9	0
Pewtress & Co., printing - - -	-		-	2	2	0
Miscellaneous:						
Negretti & Zambra, commissions - -	-		-	78	13	2
G. M. Whipple, " - -	-		-	18	15	0
J. S. Harding, jun., petty cash - - -	120	0	0			
" " - - -	80	0	0			
				200	0	0
Total -				£1164	14	7

116, *Victoria Street, March* 23, 1882.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE. | PROFESSOR STOKES.
MR. GALTON. | LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (March 10) were read and confirmed.

The following draft letter to the Colonial Office on the subject of storm warnings in China (Minutes, p. 131), was read and approved :—

SIR, March 24, 1882.

I AM instructed by the Meteorological Council to forward to you the enclosed correspondence, and to invite the attention of the Secretary of State for the Colonies to the great importance to British shipping of the proposal to which it refers, namely, the establishment of a system of storm warnings for the China coasts, which, as his Lordship will be well aware, are subject at certain seasons of the year to destructive storms, known as typhoons. Such a system, the Council observe, has been already organised by the Indian Government, and is in operation, for the Bay of Bengal, which is subject to similar dangerous storms.

The Council are aware that the introduction of such a system on the China coasts must depend greatly on the action of the Chinese Government; but they think the proposal so important in the interests of British commerce, that they venture to express the hope that it may be favourably considered by Her Majesty's Government, with a view to its being recommended to the Colonial Government of Hong Kong for any support to the plan which that Goverment could offer.

I have, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

The Under Secretary of State for the Colonies,
Colonial Office.

Reported—That the broken thermometer from the balloon "Saladin" had been forwarded to Mrs. Jenkins, and had been accepted by her (Letter 693).

* Four weeks ending 25th February.

Read a letter (677), from Captain Templer, requesting permission to reprint, in an article for a magazine, his letter of December 31, addressed to the Council (Minutes, p. 100).—Permission granted.

The Secretary was authorised to allow Captain Templer the sum of 26*l.* 5*s.* for his personal expenses, being at the rate of one guinea per day for 25 days.

It was resolved that a brief report be prepared by Mr. C. Harding of the results of the Meteorological observations hitherto made in balloons, and that the results obtained in 1880–81, under the authority of the Council, should be worked up as far as possible.

Submitted—The following checking of the forecasts for February 1882 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	33	28	31	75
,,	b	42	46	44	
,,	c	21	17	19	
,,	d	4	9	6	
Scotland, E.	a	38	38	38	90
,,	b	50	54	52	
,,	c	8	—	4	
,,	d	4	8	6	
England, N.E.	a	33	29	31	89
,,	b	58	58	58	
,,	c	9	13	11	
,,	d	—	—	—	
England, E.	a	17	46	32	82
,,	b	58	42	50	
,,	c	25	12	18	
,,	d	—	—	—	
Midland Cos.	a	29	21	25	76
,,	b	58	63	61	
,,	c	13	16	14	
,,	d	—	—	—	
England, S.	a	13	33	23	84
,,	b	75	46	61	
,,	c	9	17	13	
,,	d	3	4	3	
Scotland, W.	a	17	63	40	86
,,	b	58	33	46	
,,	c	25	4	14	
,,	d	—	—	—	
England, N.W.	a	25	42	34	86
,,	b	63	42	52	
,,	c	4	16	10	
,,	d	8	—	4	
England, S.W.	a	25	46	36	80
,,	b	59	33	46	
,,	c	8	21	14	
,,	d	8	—	4	
Ireland, N.	a	33	42	38	94
,,	b	63	50	56	
,,	c	—	8	4	
,,	d	4	—	2	
Ireland, S.	a	25	50	38	75
,,	b	42	33	37	
,,	c	29	17	23	
,,	d	4	—	2	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	33	36	35	83
,,	b	46	50	48	
,,	c	14	11	12	
,,	d	7	3	5	
Scotland, E.	a	36	32	34	74
,,	b	54	25	40	
,,	c	7	29	18	
,,	d	3	14	8	
England, N.E.	a	39	29	34	82
,,	b	50	46	48	
,,	c	12	25	18	
,,	d	—	—	—	
England, E.	a	32	39	36	82
,,	b	50	43	46	
,,	c	18	7	13	
,,	d	—	11	5	
Midland Cos.	a	32	39	36	80
,,	b	43	46	44	
,,	c	21	11	16	
,,	d	4	4	4	
England, S.	a	21	36	29	80
,,	b	63	39	51	
,,	c	12	18	15	
,,	d	4	7	5	
Scotland, W.	a	25	32	29	81
,,	b	54	50	52	
,,	c	21	14	17	
,,	d	—	4	2	
England, N.W.	a	21	32	27	82
,,	b	61	50	55	
,,	c	14	14	14	
,,	d	4	4	4	
England, S.W.	a	29	50	40	83
,,	b	54	32	43	
,,	c	10	18	14	
,,	d	7	—	3	
Ireland, N.	a	32	32	32	88
,,	b	50	61	56	
,,	c	14	7	10	
,,	d	4	—	2	
Ireland, S.	a	25	39	32	79
,,	b	50	43	47	
,,	c	18	14	16	
,,	d	7	4	5	

Summary.

British Isles	a	26	40	33	84
,,	b	57	45	51	
,,	c	14	13	14	
,,	d	3	2	2	

British Isles	a	30	36	33	81
,,	d	52	44	48	
,,	c	14	15	15	
,,	d	4	5	4	

Read—A memorandum from Captain Toynbee reporting that since the last meeting five logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. John Smith -	Ship "Naiad" -	June 7, 1881—March 8, 1882.	Valparaiso, Talcahuano, home.	1881, p. 3.
Lieut. A. Carpenter, R.N, commanding, and Lieut. A. Balfour, R.N.	H.M.S. "Magpie"	Sept. 1—Dec. 31, 1881.	Surveying in China Sea -	1881, p. 88.
Capt. J. P. Maclear, R.N., Lieut. C. W. Le P. Beresford, R.N.	H.M.S. "Alert"	Sept. 1, 1881—Jan. 31, 1882.	Surveying, Arafura Sea -	1881, p. 55.
Capt. G. H. Jones -	S.S. "Lamperts"	Sept. 16, 1881—March 19, 1882.	Bombay, Baltimore, home	1881, p. 55.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

The proposed Meteorological Atlas of the British Isles (Minutes, p. 98), was considered, and draft charts of temperature and pressure, prepared by Mr. Gaster from the data tabulated by Mr. Marriott, were submitted and compared with the charts drawn by Mr. Marriott.

General Strachey was requested to have an interview with Mr. Marriott, with reference to the data contained in the tables from which the charts are drawn.

Mr. Scott was instructed to report at next meeting as to the printing of the sea temperature charts by Mr. Baillie, submitted at last meeting.

General Strachey proposed—That the Kew Committee be requested to institute systematic observations of solar radiation, with the instrument designed by Professor Balfour Stewart, which can be placed at their disposal by the Science and Art Department.

The observations to be made on days on which the atmosphere is favourable, and continued, if possible, so as to extend from four hours before, to four hours after, noon. —Approved.

The draft of the headings for the Annual Report was considered.

Reported—That Mr. B. Marshall had resigned on the 18th instant.

LONDON:
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Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.
[1703.—25.—4/82.]

METEOROLOGICAL OBSERVATIONS IN THE NORTH ATLANTIC OCEAN.

No.

SHIP'S NAME AND DESCRIPTION { _____

OWNER'S NAME AND ADDRESS { _____

CAPTAIN'S NAME AND ADDRESS { _____

See the back of this Form for Instructions.

The address to which this form is to be returned is printed on the back; please fold it, affix a stamp and post it without any fastening.

YEAR 188..... MONTH..... Day.	Hour.	Barometer. Mercurial or Aneroid. (a)	Attached Thermometer.	Temperature Air on Deck.	Temperature Sea Surface.	Compass Deviation (due to the iron of the ship) on the course steered. (b)	Wind Direction by Compass (c)	Wind Force.	Weather.	Ship's Position at Noon.	Time of Remark.	Remarks. (1) Giving the times of important changes of wind, with the direction and force before and after the change. (2) Giving the reading of the lowest barometer during a gale and the time of its occurrence, with the direction and force of wind at that time.
1	8 A.M.									Lat.		
	Noon									Long.		
2	8 A.M.									Lat.		
	Noon									Long.		
3	8 A.M.									Lat.		
	Noon									Long.		
4	8 A.M.									Lat.		
	Noon									Long.		
5	8 A.M.									Lat.		
	Noon									Long.		
6	8 A.M.									Lat.		
	Noon									Long.		
7	8 A.M.									Lat.		
	Noon									Long.		
8	8 A.M.									Lat.		
	Noon									Long.		
9	8 A.M.									Lat.		
	Noon									Long.		

(a) Erase "or Aneroid" if it be a mercurial barometer, and "Mercurial or" if it be an aneroid; if both are on board always record the mercurial in preference to the aneroid.
(b) The Compass Deviation on the course steered should be copied from the Deviation Card; the Variation is not asked for.
(c) The corrections for Deviation and Variation will be applied in the Office.

YEAR 188..... ONTH		Barometer. — Mercurial or Aneroid. (a)	Attached Thermometer.	Temperature		Compass Deviation (due to the iron of the ship) on the course steered. (b)	Wind		Weather.	Ship's position at Noon.	Time of Remark.	Remarks. (1) Giving the times of important changes of wind, with the direction and force before and after the change. (2) Giving the reading of the lowest barometer during a gale and the time of its occurrence, with the direction and force of wind at that time.
Day.	Hour.			Air on Deck.	Sea Surface.		Direction by Compass. (c)	Force.				
10	8 A.M.									° ' Lat.		
	Noon									Long.		
11	8 A.M.									Lat.		
	Noon									Long.		
12	8 A.M.									Lat.		
	Noon									Long.		
13	8 A.M.									Lat.		
	Noon									Long.		
14	8 A.M.									Lat.		
	Noon									Long.		
15	8 A.M.									Lat.		
	Noon									Long.		
16	8 A.M.									Lat.		
	Noon									Long.		
17	8 A.M.									Lat.		
	Noon									Long.		
18	8 A.M.									Lat.		
	Noon									Long.		
19	8 A.M.									Lat.		
	Noon									Long.		
20	8 A.M.									Lat.		
	Noon									Long.		

YEAR 188.. ... MONTH		Barometer. Mercurial or Aneroid. (a)	Attached Thermometer.	Temperature Air on Deck.	Temperature Sea Surface.	Compass Deviation (due to the iron of the ship) on the course steered. (b)	Wind Direction by Compass. (c)	Wind Force.	Weather.	Ship's Position at Noon.	Time of Remark.	Remarks. (1) Giving the times of important changes of wind, with the direction and force before and after the change. (2) Giving the reading of the lowest barometer during a gale and the time of its occurrence, with the direction and force of wind at that time.
Day.	Hour.											
21	8 A.M.									Lat.		
	Noon									Long.		
22	8 A.M.									Lat.		
	Noon									Long.		
23	8 A.M.									Lat.		
	Noon									Long.		
24	8 A.M.									Lat.		
	Noon									Long.		
25	8 A.M.									Lat.		
	Noon									Long.		
26	8 A.M.									Lat.		
	Noon									Long.		
27	8 A.M.									Lat.		
	Noon									Long.		
28	8 A.M.									Lat.		
	Noon									Long.		
29	8 A.M.									Lat.		
	Noon									Long.		
30	8 A.M.									Lat.		
	Noon									Long.		
31	8 A.M.									Lat.		
	Noon									Long.		

(a) Erase "or Aneroid" if it be a mercurial barometer, and "Mercurial or" if it be an aneroid; if both are on board always record the mercurial in preference to the aneroid.
(b) The Compass Deviation on the course steered should be copied from the Deviation Card; the Variation is not asked for.

METEOROLOGICAL OFFICE, LONDON.

The Meteorological Council propose to chart and discuss the weather of the North Atlantic Ocean for the thirteen months, beginning August 1st, 1882, and ending August 31st, 1883; and they request owners, captains, and officers of steam vessels, and sailing vessels traversing the North Atlantic Ocean to assist in the work, by furnishing observations transcribed on forms of which this sheet is a specimen, and which will be supplied by the Office. The Council propose to discuss the observations as early as possible. The use of the forms will save much time and labour in the Meteorological Office, and it is believed that the transcription from the log will cause but little trouble to the observers.

OBSERVATIONS TO BE TAKEN AT SEA AT 8 A.M. AND AT NOON OF SHIP'S TIME.

Barometer and (if a thermometer is attached to it) **the Attached Thermometer.** Give, if possible, a few readings in port before leaving, and in each port which you visit.

Temperature of Air in the shade on Deck (if observations can be made).

Temperature of Sea Surface (if observations can be made).

Compass Deviation (that is, the error due to the iron of the ship) **on the course steered.**

Wind—Direction (by compass) and Force.—The force may be expressed in words, or by the figures of Beaufort's scale, whichever the observer is in the habit of using.

Weather.—In words or by the letters of Beaufort's notation, whichever the observer is in the habit of using.

Position of Ship—At Noon only.

In the column headed **Remarks** please to enter—

(1) Whenever an important change of wind occurs—the time of its occurrence, and the direction and force of the wind before and after the change.

(2) Whenever a gale occurs—the lowest reading of the barometer during the gale, the time of the lowest reading, and the direction and force of the wind at that time.

Officers willing to observe are requested to communicate with the

MARINE SUPERINTENDENT,

Meteorological Office, 116, *Victoria Street, LONDON, S.W.*,

stating how many monthly forms they want. They should give an address to which additional forms can be sent.

F & T. 20,000 4—82

BEAUFORT'S SCALE OF WIND FORCE.

0	Calm.		
1	Light air	Just sufficient to give steerage way.	
2	Light breeze	With which a well conditioned Ship of War of Admiral Beaufort's time (1800—1850), with all sail set would go in smooth water and "clean full," from	1 to 2 knots.
3	Gentle breeze		3 to 4 knots.
4	Moderate breeze		5 to 6 knots.
5	Fresh breeze	To which she could just carry in chase, "full and by"	Royals, &c.
6	Strong breeze		Single-reefed topsails and topgallant sails.
7	Moderate gale		Double-reefed topsails, jib, &c.
8	Fresh gale		Triple-reefed topsails, &c.
9	Strong gale		Close-reefed topsails and courses.
10	Whole gale	With which she could scarcely bear close reefed maintopsail and reefed foresail.	
11	Storm	Which would reduce her to storm-stay-sails.	
12	Hurricane	Which no canvas could withstand.	

FOR SHIPS RIGGED WITH DOUBLE TOPSAILS.*

6 Topgallant sails.
7 Topsails, jib, &c.
8 Reefed upper topsails and courses.
9 Lower topsails and courses.
10 Lower maintopsail and reefed foresail.

* These modifications are made to meet the requirements of double topsails, introduced since Admiral Beaufort's time.

FIX POSTAGE STAMP HERE

THE MARINE SUPERINTENDENT,

Meteorological Office,

116, *Victoria Street,*

LONDON, S.W.

BEAUFORT'S NOTATION OF WEATHER.

b Blue Sky.	l Lightning.	s Snow.
c Clouds (detached).	m Misty (hazy).	t Thunder.
d Drizzling Rain.	o Overcast.	u Ugly (threatening) appearance of Weather.
f Foggy.	p Passing Showers.	v Visibility. Objects at a distance unusually visible.
g Gloomy.	q Squally.	w Dew.
h Hail.	r Rain.	

NOTE.—A bar (–) under any letter indicates increased intensity; thus f very fog r heavy rain; r very heavy rain.